PMED LAB 4/99

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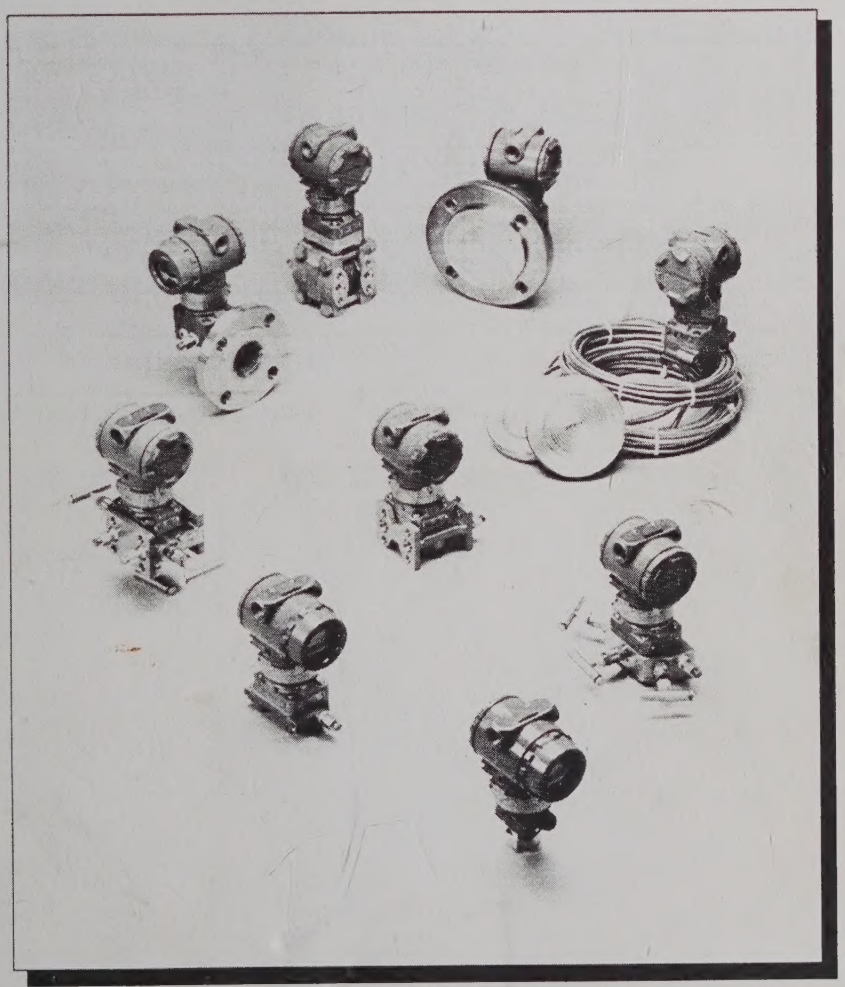
English
Rev. CA

Model 3051 Smart Pressure Transmitter Family



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Model 3051 Smart Pressure Transmitter Family

Model 3051 Smart Software Revision 5.2.x

NOTICE

Read this manual before working with the product. For personal and system safety, and for optimum product performance, make sure you thoroughly understand the contents before installing, using, or maintaining this product.

Within the United States, Rosemount Inc. has two toll-free assistance numbers.

Customer Central: 1-800-999-9307 *(7:00 a.m. to 7:00 p.m. CST)*
Technical support, quoting, and order-related questions.

North American Response Center: 1-800-654-7768 *(24 hours a day – Includes Canada)*
Equipment service needs.

For equipment service or support needs outside the United States, contact your local Rosemount representative.

⚠CAUTION

The products described in this document are NOT designed for nuclear-qualified applications.

Using non-nuclear qualified products in applications that require nuclear-qualified hardware or products may cause inaccurate readings.

For information on Rosemount nuclear-qualified products, contact your local Rosemount Sales Representative.

SNF-0004

Rosemount Model 3051 Smart Pressure Transmitters may be protected by one or more of the following U.S. Patent Nos. 4,370,890; 4,466,290; 4,612,812; 4,791,352; 4,798,089; 4,818,994; 4,833,922; 4,866,435; 4,926,340; 4,988,990; and 5,028,746. Mexico Patentado No. 154,961. May depend on model. Other foreign patents issued and pending.

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IMPORTANT

Procedures and instructions in this manual may require special precautions to ensure the safety of the personnel performing the operations. Information that potentially raises safety issues is indicated by a warning symbol (⚠). **Refer to the safety messages, listed at the beginning of each section, before performing an operation preceded by this symbol.**

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Section 1

Introduction

USING THIS MANUAL

This manual provides information on installing, operating, and maintaining devices from the Rosemount® Model 3051 Smart Pressure Transmitter Family. This manual is organized into the following sections:

Section 2–Transmitter Functions

This section provides information on the commissioning and operation of Model 3051 Pressure Transmitters. Information is also included on software functions, configuration parameters, and on-line variables.

Section 3–Installation

This section provides mechanical and electrical installation instructions.

Section 4–Troubleshooting

This section provides troubleshooting techniques for diagnostic messages associated with the transmitter.

Section 5–Specifications and Reference Data

This section provides reference and specification data for the Model 3051 Smart Pressure Transmitter Family.

Section 6–Options

This section provides descriptions of the mounting and configuration options available with Model 3051 transmitters.

Appendix A–HART Communicator

This appendix contains a communicator overview, a HART Communicator menu tree for the Model 3051 family, and a table of HART Communicator fast key sequences. A table of diagnostic messages associated with this communicator is also included.

Appendix B–Model 268 Communicator

This appendix contains a communicator overview, a Model 268 menu tree for the Model 3051 family, and a table of Model 268 fast key sequences. A table of diagnostic messages associated with this communicator is also included.

Appendix C–Approval Drawings

This appendix contains intrinsic safety drawings.

MODELS COVERED

This manual provides basic installation, commissioning, and troubleshooting information for the following Rosemount Model 3051 Pressure Transmitters:

Model 3051CD — Differential Pressure Transmitter

measures differential pressures from 0.5 inH_2O to 2,000 psi (0.12–13800 kPa) with superior performance including 0.075% accuracy and 100:1 rangeability.

Model 3051CG — Gage Pressure Transmitter

measures gage pressures from 2.5 inH_2O to 2,000 psig (0.62–13800 kPa) using proven Rosemount capacitance cell technology.

Model 3051CA — Absolute Pressure Transmitter

measures absolute pressures from 0.167 to 4,000 psia (8.6 mmHga to 27580 kPa) using Rosemount Inc.'s patented piezoresistive silicon sensor.

Model 3051L — Liquid Level Transmitter

provides precise level and specific gravity measurements from 2.5 inH_2O to 8,310 inH_2O (0.62 to 2070 kPa) for a wide variety of tank configurations.

Model 3051H — High Process Temperature Pressure Transmitter

provides high process temperature capability to 375 °F (191°C), without the use of remote diaphragm seals or capillaries. These transmitters are available for differential and gage configurations (3051HD and 3051HG).

Model 3051P — *Reference Class* Pressure Transmitter

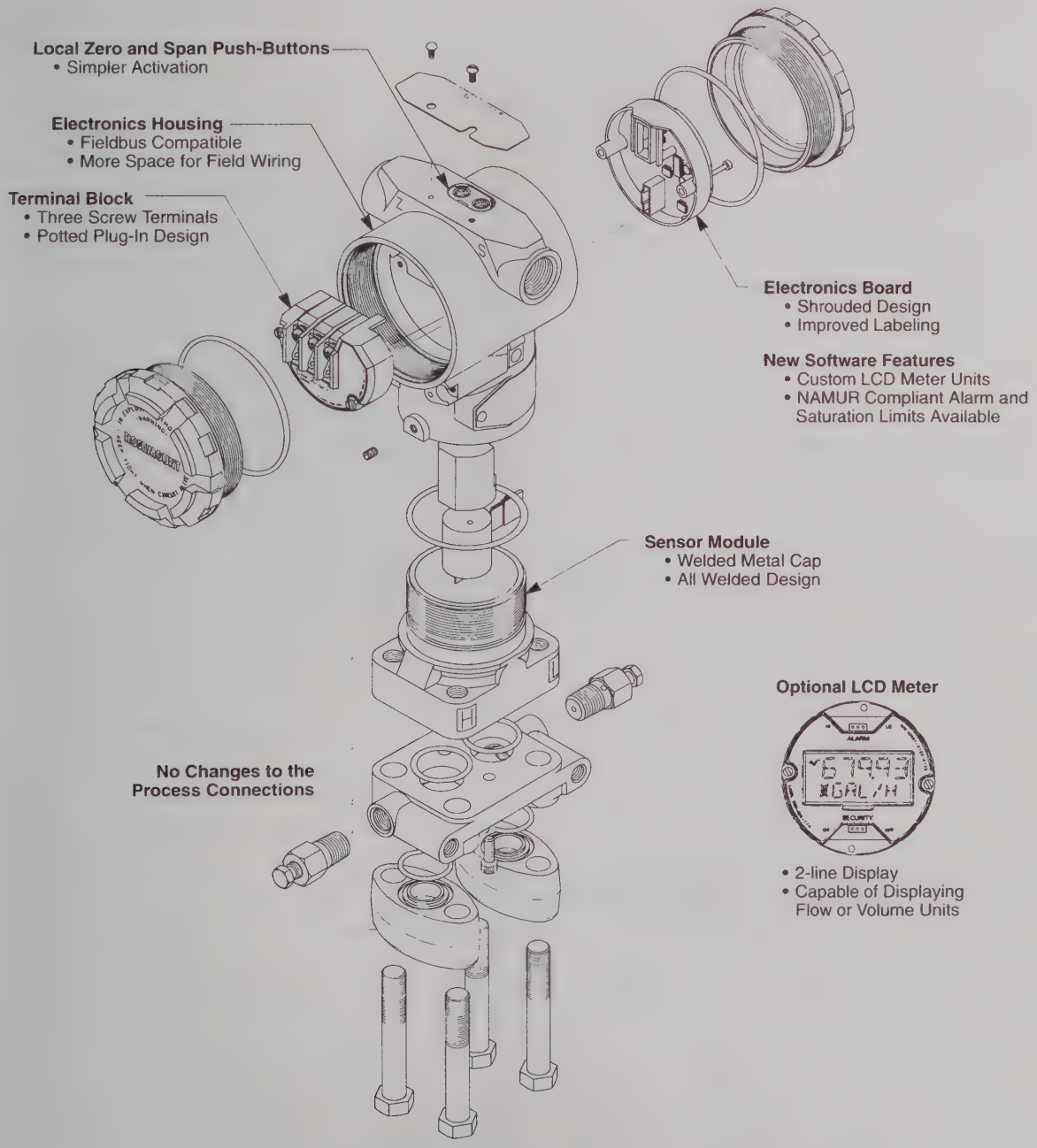
provides 0.05% accuracy. The Model 3051P is the most accurate pressure transmitter available and is ideal for fiscal and allocation metering. The Model 3051P eliminates the need to stack multiple transmitters.

Model 3051T — Gage and Absolute Pressure Transmitter

measures absolute and gage pressures from 2,000 to 10,000 psi (13800 to 68900 kPa). The Model 3051T uses a single isolator design and microprocessor-based electronics.

NEW FEATURES OF THE MODEL 3051 PRESSURE TRANSMITTER

The latest line of Rosemount Model 3051 pressure transmitters feature physical and software enhancements for additional functionality and increased ease of use.


Local Zero and Span Push-Buttons
• Simpler Activation
Electronics Housing
• Fieldbus Compatible
• More Space for Field Wiring
Terminal Block
• Three Screw Terminals
• Potted Plug-In Design
Electronics Board
• Shrouded Design
• Improved Labeling
New Software Features
• Custom LCD Meter Units
• NAMUR Compliant Alarm and Saturation Limits Available
Sensor Module
• Welded Metal Cap
• All Welded Design
Optional LCD Meter
• 2-line Display
• Capable of Displaying Flow or Volume Units
No Changes to the Process Connections

3051-3031A08B, A18B

Section 2 Transmitter Functions

OVERVIEW

This section contains information on commissioning and operating Model 3051 Smart Pressure Transmitters. Tasks that should be performed on the bench prior to installation (setting transmitter jumpers) and software functions are explained in this section.

For your convenience, HART communicator fast key sequences are listed for each software function. If you are unfamiliar with the communicator or how to follow fast key sequences, please refer to Appendices A and B for communicator operations.

SAFETY MESSAGES

Procedures and instructions in this section may require special precautions to ensure the safety of the personnel performing the operations. Information that raises potential safety issues is indicated by a warning symbol (⚠). Refer to the following safety messages before performing an operation preceded by this symbol.

Warnings (⚠)

⚠WARNING

Explosions can result in death or serious injury.

- Do not remove the transmitter covers in explosive environments when the circuit is alive.
- Both transmitter covers must be fully engaged to meet explosion-proof requirements.
- Before connecting a communicator in an explosive atmosphere, make sure the instruments in the loop are installed in accordance with intrinsically safe or nonincendive field wiring practices.

⚠WARNING

Electrical shock can result in death or serious injury.

- Avoid contact with the leads and the terminals. High voltage that may be present on leads can cause electrical shock.

COMMISSIONING THE TRANSMITTER ON THE BENCH

Commissioning consists of testing the transmitter, testing the loop, and verifying transmitter configuration data. You may commission Model 3051 transmitters either before or after installation. Commissioning the transmitter on the bench before installation ensures that all transmitter components are in good working order and acquaints you with the operation of the device.

To avoid exposing the transmitter electronics to the plant environment after installation, set the failure mode and transmitter security jumpers during the commissioning stage on the bench.

FAILURE MODE ALARM

As part of normal operation, the Model 3051 continuously monitors its own operation. This automatic diagnostic routine is a timed series of checks repeated continuously. If the diagnostic routine detects a failure, the transmitter drives its output either below or above specific values depending on the position of the failure mode jumper.

- For 4–20 mA transmitters factory-configured for standard operation, the transmitter drives its output either below 3.75 mA or above 21.75 mA.
- For 4–20 mA transmitters factory-configured for NAMUR-compliant operation, the transmitter drives its output either below 3.6 mA or above 22.5 mA.
- For low-power transmitters configured for 1–5 Volts, the transmitter drives its output either below 0.95 V or above 5.4 V.
- For low-power transmitters configured for 0.8–3.2 Volts, the transmitter drives its output either below 0.75 V or above 4.2 V.

The failure mode alarm jumper is located on the front of the electronics board inside of the electronics housing cover. The position of this jumper determines whether the output is driven high or low when a failure is detected (see Figure 2-1 on page 2-5). If the alarm jumper is not installed the transmitter will operate normally, and the default alarm condition will be high.

NOTE

The failure mode alarm jumper pins occupy one row of a ten-pin socket that also is used to attach the optional LCD meter. In order to function appropriately, the jumper must be positioned correctly, as shown in Figure 2-1 on page 2-5.

Failure Mode Alarm vs. Saturation Output Values

The failure mode alarm output levels differ from the output values that occur when applied pressure is outside the range points. When pressure is outside the range points, the analog output continues to track the input pressure until reaching the saturation value listed below; the output does not exceed the listed saturation value regardless of the applied pressure. For example, with standard alarm and saturation levels and pressures outside the 4–20 range points, the output saturates at 3.9 mA or 20.8 mA. When the transmitter diagnostics detect a failure, the analog output is set to a specific alarm value that differs from the saturation value to allow for proper troubleshooting.

TABLE 2-1. Analog Output: Standard Alarm Values vs. Saturation Values.

Level	4–20 mA Saturation Value	4–20 mA Alarm Value	1–5 V Saturation Value	1–5 V Alarm Value	0.8–3.2 V Saturation Value	0.8–3.2 V Alarm Value
Low	3.9 mA	≤ 3.75 mA	0.97 V	≤ 0.95 V	0.78	≤ 0.75 V
High	20.8 mA	≥ 21.75 mA	5.20 V	≥ 5.4 V	4.04	≥ 4.2 V

TABLE 2-2. Analog Output: NAMUR-Compliant Alarm Values vs. Saturation Values.

Level	4–20 mA Saturation Value	4–20 mA Alarm Value
Low	3.8 mA	≤ 3.6 mA
High	20.5 mA	≥ 22.5 mA

NOTE
You can alter the actual transmitter mA output values from the values listed above by performing an analog output trim (see Page 2-20).

NOTE
When a transmitter is in an alarm condition, the hand-held HART communicator indicates the analog output the transmitter would drive if the alarm condition did not exist.

Alarm and Saturation Values for Transmitters Set to Burst Mode

Saturation and alarm conditions operate differently when a transmitter is set to burst mode operation:

Alarm Condition (Hi or Lo):

1. Analog output switches to alarm level (see Table 2-1).
2. Primary variable (pressure) is burst with a status bit set.
3. Percent of range follows primary variable (pressure).
4. Temperature is burst with a status bit set.

(Note that during alarm conditions, the burst primary variable, percent of range, or temperature may not be valid depending on the error type – refer to the HART protocol for details.)

Saturation:

1. Analog output switches to saturation level (see Table 2-1).
2. Primary variable (pressure) is burst normally.
3. Temperature is burst normally.

Alarm Level Verification

Transmitters with electronics board revision 5.3 or later (shrouded design) have increased functionality that allows verification testing of alarm current levels. If you repair or replace the transmitter electronics board, sensor module or LCD meter, verify the transmitter alarm level before you return the transmitter to service. This feature is also useful in testing the reaction of your control system to a transmitter in an alarm state. To verify the transmitter alarm levels, perform a loop test (see "Loop Test" on page 2-13).

TRANSMITTER SECURITY

You can prevent changes to the transmitter configuration data with the write protection jumper. Position the jumper on the transmitter circuit board in the "ON" position to prevent accidental or deliberate change of configuration data. Figure 2-1 shows the jumper positions for 4–20 mA transmitters. Figure 2-2 shows the jumper positions for low-power transmitters. For transmitters with an optional LCD meter, see "LCD Meter" on page 6-2.

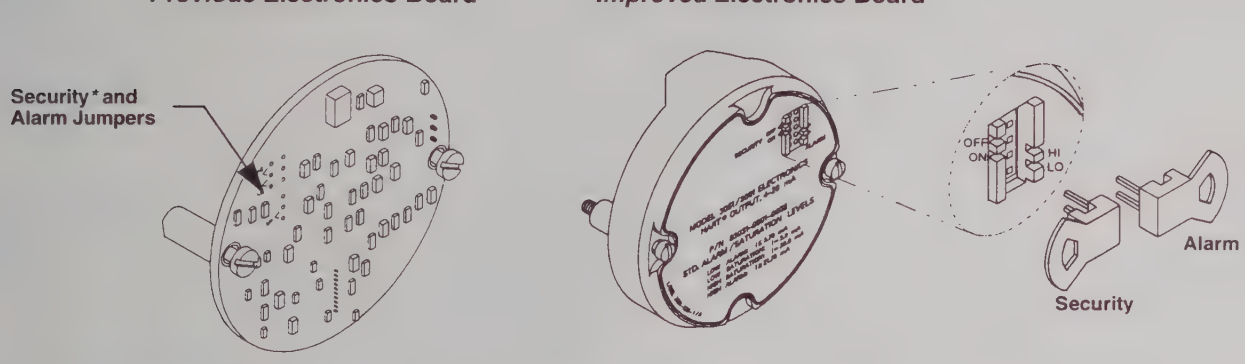
If the transmitter write protection jumper is in the "ON" position, the transmitter will not accept any "writes" to its memory. Configuration changes (such as digital trim and reranging) cannot take place when the transmitter security is on. To reposition the jumper, perform the following procedure.

1. If the transmitter is installed, secure the loop, and remove power.
2. ⚠ Remove the housing cover opposite the field terminal side. Do not remove the transmitter covers in explosive atmospheres when the circuit is alive.
3. Reposition the jumper. See Figure 2-1 for the ON and OFF jumper positions. Previous circuit boards carried a two-pin or three-pin jumper assembly on the connector side of the board (see Figure 2-1). To activate security using a two-pin version, install the jumper. To activate security with the three-pin assembly, move the jumper to the ON pin position.
4. ⚠ Reattach the transmitter cover. Transmitter covers must be fully engaged to meet explosion-proof requirements.

NOTE
If the security jumper is not installed, the transmitter will continue to operate in the security OFF configuration.

⚠ See "Safety Messages" on page 2-1 for complete warning information.

FIGURE 2-1. 4–20 mA Transmitter Electronics Boards.



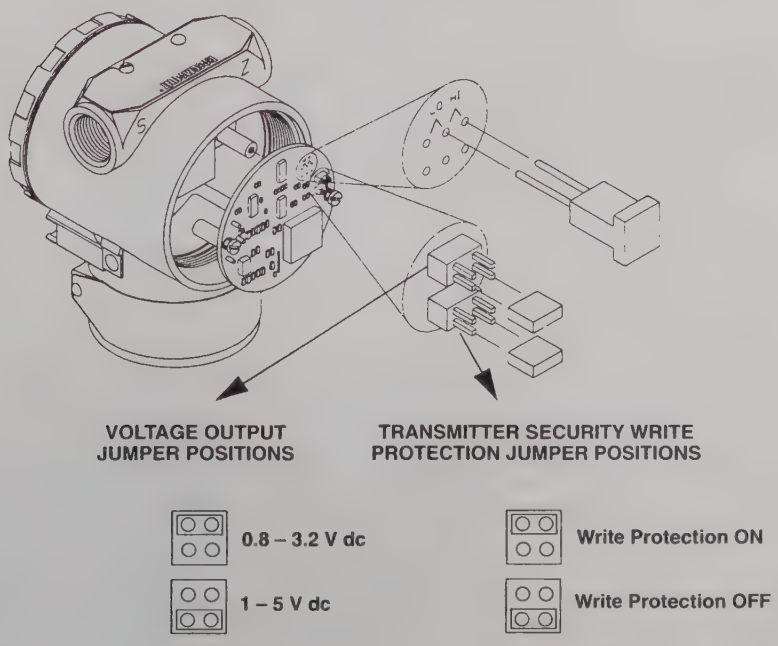
* For one previous version of the electronics board, the transmitter security jumper is located on the back side of the electronics board. Contact Rosemount Customer Central at 1-800-999-9307 for more information

SELECTING OUTPUT RANGE FOR LOW-POWER OUTPUT TRANSMITTERS

Figure 2-2 shows the appropriate jumper position to configure the transmitter for low-power output (0.8–3.2 V dc or 1.0–5.0 V dc).

NOTE
The standard low-power output is 1–5 V dc, unless otherwise specified. If you change the low-power output (from 1–5 to 0.8–3.2, or from 0.8–3.2 to 1–5), perform a low-power output trim as explained on page 2-20.

FIGURE 2-2. Low Power Transmitter Electronics Boards


VOLTAGE OUTPUT JUMPER POSITIONS
TRANSMITTER SECURITY WRITE PROTECTION JUMPER POSITIONS
0.8 – 3.2 V dc
1 – 5 V dc
Write Protection ON
Write Protection OFF

COMMISSIONING THE MODEL 3051 WITH A HART-BASED COMMUNICATOR

Before placing the Model 3051 into operation, you should commission the instrument using a HART-based communicator.

⚠ To commission on the bench, connect the transmitter and the communicator as shown in Figure 2-3 or 2-4. Make sure the instruments in the loop are installed in accordance with intrinsically safe or nonincendive field wiring practices before connecting a communicator in an explosive atmosphere. Connect the communicator leads at any termination point in the signal loop. It is most convenient to connect them to the terminals labeled "COMM" on the terminal block. Connecting across the "TEST" terminals will prevent successful communication.

For 4–20 mA transmitters, you will need a power supply capable of providing 10.5 to 55 V dc at the transmitter, and a meter to measure output current. To enable communication, a resistance of at least 250 ohms must be present between the communicator loop connection and the power supply. Do not use inductive-based transient protectors with the Model 3051.

Setting the Loop to Manual

Whenever you are preparing to send or request data that would disrupt the loop or change the output of the transmitter, you must set your process application loop to manual. Both the HART Communicator Model 275 and the Rosemount Model 268 will prompt you to set the loop to manual when necessary. Keep in mind that acknowledging this prompt does not set the loop to manual. The prompt is only a reminder; you have to set the loop to manual yourself, as a separate operation.

Wiring Diagrams (Bench Hook-up)

Connect the bench equipment as shown in Figure 2-3 or 2-4, and turn on the HART-based communicator by pressing the ON/OFF key. The communicator will search for a HART-compatible device and will indicate when the connection is made. If the communicator fails to connect, it will indicate that no device was found. If this occurs, refer to Section 4–Troubleshooting.

FIGURE 2-3. Bench Hook-up (4–20 mA Transmitters).

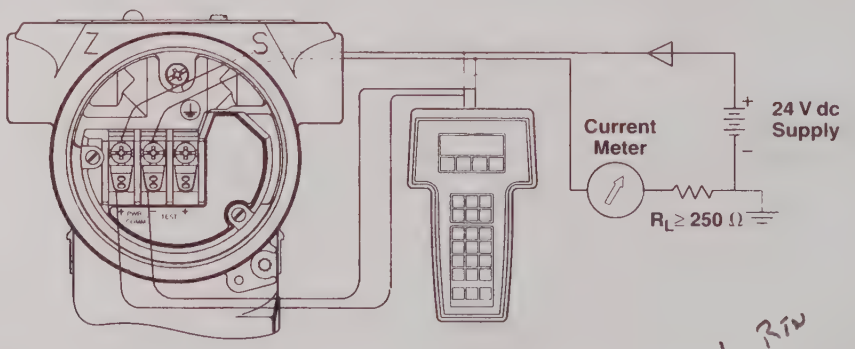
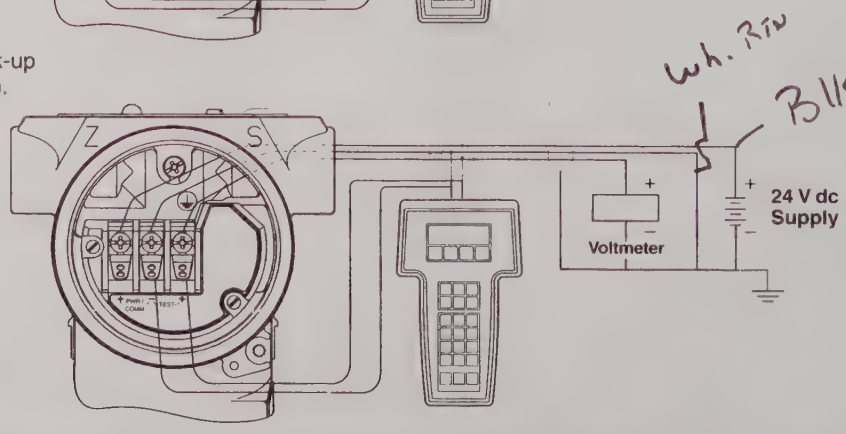


FIGURE 2-4. Bench Hook-up (Low-Power Transmitters).



⚠ See "Safety Messages" on page 2-1 for complete warning information.

Wiring Diagrams (Field Hook-up)

The following diagrams illustrate wiring loops for a field hook-up with a HART-based communicator.

FIGURE 2-5. Field Hook-up (4–20 mA Transmitters).

CAUTION
Do not use inductive-based transient protectors.

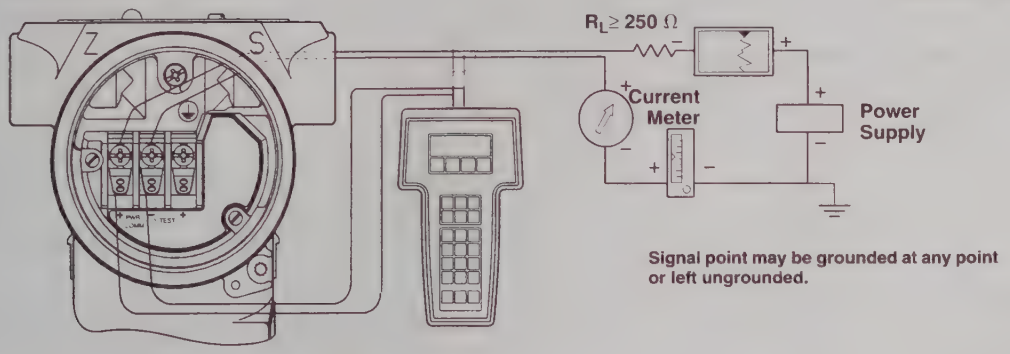
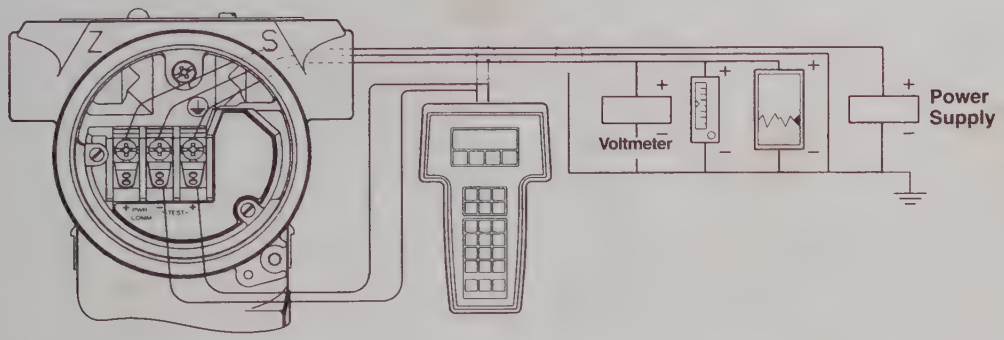


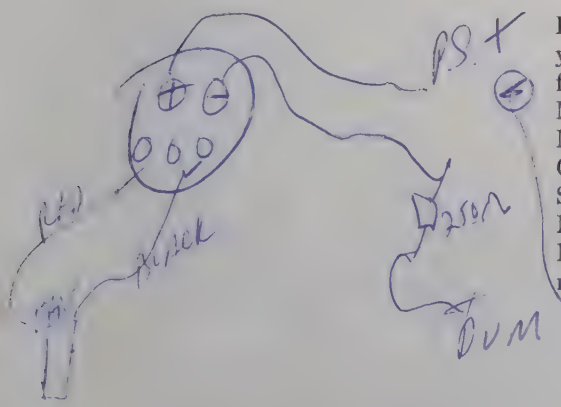
FIGURE 2-6. Field Hook-up (Low-Power Transmitters).



REVIEW CONFIGURATION DATA

HART Comm.	1, 5
Model 268	Review Key

NOTE
Information and procedures in this section that make use of HART Communicator fast key sequences assume that the transmitter and communicator are connected, powered, and operating correctly. If you are not familiar with the HART Communicator or fast-key sequences, refer to Appendix A - HART Communicator.



Before you place the transmitter into operation, it is recommended that you review the transmitter configuration data that was set at the factory. You should review the following configuration data: Transmitter Model, Type, Tag, Range, Date, Descriptor, Message, Minimum and Maximum Sensor Limits, Minimum Span, Units, 4 and 20 mA points, Output (linear or square root), Damping, Alarm Setting (high, low), Security Setting (on, off), Local Keys (enabled, disabled), Integral Meter, Sensor Fill, Isolator Material, Flange (type, material), O-Ring Material, Drain/Vent, Remote Seal (type, fill fluid, isolator material, number), Transmitter S/N, Address, and Sensor S/N.

CHECK OUTPUT

Before performing other transmitter on-line operations, review the digital output parameters to ensure that the transmitter is operating properly and is configured to the appropriate process variables.

Process Variables

HART Comm.	2
Model 268	PV

The process variables for the Model 3051 provide the transmitter output, and are continuously updated. The process variable menu displays the following process variables:

- Pressure
- Percent of Range
- Analog Output

The pressure reading in both Engineering Units and Percent of Range will continue to track with pressures outside of the defined range from the lower to the upper range limit of the sensor module.(1)

Sensor Temperature

HART Comm.	1, 1, 4
Model 268	PV, F3

The Model 3051 contains a temperature sensor just above its pressure sensor in the sensor module. When reading this temperature, keep in mind that this is not a process temperature reading.

BASIC SETUP

Set Process Variable Units

HART Comm.	1, 3
Model 268	F3, F2

The *PV Unit* command sets the process variable units to allow you to monitor your process using the appropriate units of measure. Select from the following engineering units:

- inH_20
- inH_20 at 4 °C(2)
- inHg
- ftH_20
- mmH_20
- mmH_20 at 4 °C(2)
- mmHg
- psi
- bar
- mbar
- g/cm^2
- kg/cm^2
- Pa
- kPa
- torr
- atm

(1) Previous versions of the software will track with pressure up to 105% of span, and remain there as pressure increases.
(2) Not available with low power or previous Model 3051 transmitters.

Set Output

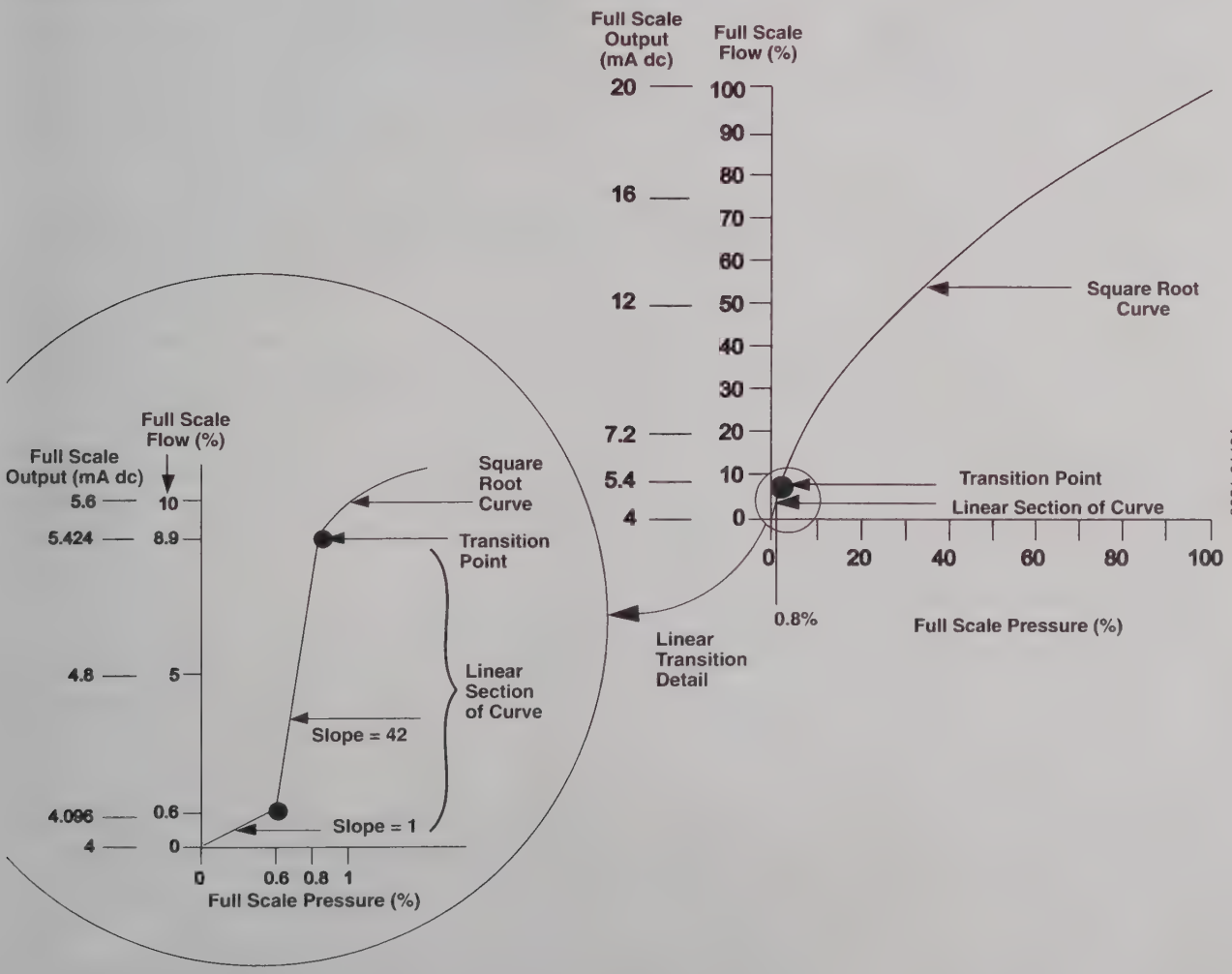
HART Comm.	1, 3, 5
Model 268	F3, F2, F1, F1

Activate the transmitter square root output option to make the analog output proportional to flow. To avoid the extremely high gain that results as the input approaches zero, the Model 3051 automatically switches to a linear output in order to ensure a more stable output near zero. The transition from linear to square root output is smooth, with no step change or discontinuity in output (see Figure 2-7).

The transition from linear to square root is not adjustable. It occurs at 0.8% of ranged pressure input or 9% of full-scale flow output in transmitters with Revision 5.2 or higher software. In earlier software, the transition point occurred at 4% of ranged pressure input, or 20% of full scale flow output.

From 0 percent to 0.6 percent of the ranged pressure input, the slope of the curve is unity (y = x). This allows accurate calibration near zero. Greater slopes would cause large changes in output for small changes at input. From 0.6 percent to 0.8 percent, the slope of the curve equals 42 (y = 42x) to achieve continuous transition from linear to square root at the transition point.

FIGURE 2-7. Square Root Output Transition Point.



Rerange

The *Range Values* command sets the 4 and 20 mA points (lower and upper range values). Setting the range values to the limits of expected readings maximizes transmitter performance; the transmitter is most accurate when operated within the expected pressure ranges for your application. In practice, you may reset the transmitter range values as often as necessary to reflect changing process conditions.

NOTE
Regardless of the range points, the Model 3051 will measure and report all readings within the digital limits of the sensor. For example, if the 4 and 20 mA points are set to 0 and 10 inH_20, and the transmitter detects a pressure of 25 inH_20, it digitally outputs the 25 in H_20 reading and a 250% percent of span reading. However, there may be up to ±5.0% error associated with output outside of the range points.

You may use one of three methods to rerange the transmitter. Each method is unique; examine all three closely before deciding which method to use.

Rerange with a Communicator Only

HART Comm.	1, 2, 3, 1, 1
Model 268	F3, F2, F1, F3, F1

Reranging using only the communicator is the easiest and most popular way to rerange the transmitter. This method changes the values of the analog 4 and 20 mA points independently without a pressure input.

NOTE
Changing the lower or upper range point results in similar changes to the span.

To rerange using only the communicator enter the fast-key sequence above, select *1 Keypad input*, and follow the on-line instructions. Or enter the values directly from the HOME screen.

NOTE
If the transmitter security jumper is in the "ON" position, you will not be able to make adjustments to the zero and span. Refer to Figure 2-1 on page 2-5 for the appropriate placement of the transmitter security jumper.

Rerange with a Pressure Input Source and a Communicator

HART Comm.	1, 2, 3, 1, 2
Model 268	F3, F2, F1, F3, F2

Reranging using the communicator and a pressure source or process pressure is a way of reranging the transmitter when specific 4 and 20 mA points are not known. This method changes the values of the analog 4 and 20 mA points.

NOTE
When you set the 4 mA point the span is maintained; when you set the 20 mA point the span changes. If you set the lower range point to a value that causes the upper range point to exceed the sensor limit, the upper range point is automatically set to the sensor limit, and the span is adjusted accordingly.

To rerange using the communicator and a pressure source or process pressure enter the fast-key sequence above, select *2 Apply values*, and follow the on-line instructions.

NOTE
If the transmitter security jumper is in the "ON" position, you will not be able to make adjustments to the zero and span. Refer to Figure 2-1 on page 2-5 for the appropriate placement of the transmitter security jumper.

Rerange with a Pressure Input Source and the Local Zero and Span Buttons

Reranging using the local zero and span adjustments (see Figure 2-8 on page 2-12), and a pressure source is a way of reranging the transmitter when specific 4 and 20 mA points are not known and a communicator is not available.

NOTE
When you set the 4 mA point the span is maintained; when you set the 20 mA point the span changes. If you set the lower range point to a value that causes the upper range point to exceed the sensor limit, the upper range point is automatically set to the sensor limit, and the span is adjusted accordingly.

To rerange the transmitter using the span and zero buttons, perform the following procedure.

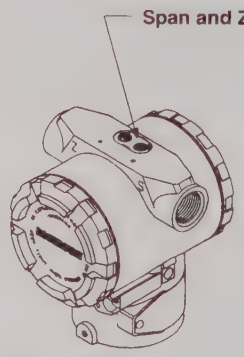
1. Loosen the screw holding the certifications label on top of the transmitter housing, and rotate the label to expose the zero and span buttons (see Figure 2-8 on page 2-12).
2. Using a pressure source with an accuracy three to ten times the desired calibrated accuracy, apply a pressure equivalent to the lower range value to the high side of the transmitter.
3. To set the 4 mA point, press and hold the zero button for at least two seconds, then verify that the output is 4 mA. If a meter is installed, it will display ZERO PASS.

NOTE
The zero and span adjustments on previous versions of the transmitter are screws instead of buttons. To activate the zero and span adjustments loosen the screws until they pop up.

4. Apply a pressure equivalent to the upper range value to the high side of the transmitter.
5. To set the 20 mA point, press and hold the span button for at least two seconds, then verify that the output is 20 mA. If a meter is installed, it will display SPAN PASS.

NOTE
If the transmitter security jumper is in the "ON" position, or if the local zero and span adjustments are disabled through the software, you will not be able to make adjustments to the zero and span using the local buttons. Refer to Figure 2-1 on page 2-5 for the proper placement of the transmitter security jumper. Or refer to "Local Span and Zero Control" on page 2-12 for instructions on how to enable the span and zero buttons.

FIGURE 2-8. Local Zero and Span Adjustments.



After you rerange the transmitter using the span and zero adjustments, it is possible to disable the adjustments to prevent further reranging. Refer to "Local Span and Zero Control" below for more information.

Damping

HART Comm.	1, 3, 6
Model 268	F3, F2, (F1 x 3)

The PV damp command changes the response time of the transmitter to smooth variations in output readings caused by rapid changes in input. Determine the appropriate damping setting based on the necessary response time, signal stability, and other requirements of the of loop dynamics of your system. The default damping value is 0.4 seconds, and can be reset to any value between 0 and 25.6 seconds.

LCD Meter Options

HART Comm.	1, 4, 3, 4
Model 268	not available

The *Meter Options* command allows you to customize the LCD meter for use in your application. You can configure the meter to display the following information:

- Engineering Units
- Percent of Range
- User-Configurable LCD Scale(1)
- Alternating between any two of the above

The user-configurable scale is a new feature that enables you to configure the LCD meter to a custom scale using a Model 275 HART communicator. With this feature you can define the decimal point position, the upper range value, the lower range value, the engineering units, and the transfer function. Refer to "Custom Meter Output" on page 6-7 for complete information.

DETAILED SETUP

Local Span and Zero Control

HART Comm.	1, 4, 4, 1, 7
Model 268	F4, F4, F2, F1

The *Local keys* command allows software control over the use of the local span and zero adjustments. To enable or disable the span and zero adjustment buttons on your transmitter, perform the fast key sequence at left.

NOTE
Disabling the local keys does not disable all transmitter configuration changes. With the local keys disabled, you can still make changes to the transmitter configuration using a HART Communicator.

(1) The user-configurable LCD scale is a feature specific to the new 4–20 mA output transmitters. If you have a previous Model 3051 transmitter, upgrade the transmitter electronics and LCD display to attain this new functionality.

DIAGNOSTICS AND SERVICE

The diagnostics and service functions listed here are primarily for use after you install the transmitter in the field. The *transmitter test* feature is designed to verify that the transmitter is operating properly, and can be performed either on the bench or in the field. The *loop test* feature is designed to verify proper loop wiring and transmitter output, and should only be performed after you install the transmitter.

Transmitter Test

HART Comm.	1, 2, 1, 1
Model 268	F2, F2

The transmitter test command initiates a more extensive diagnostics routine than that performed continuously by the transmitter. The transmitter test routine can quickly identify potential electronics problems. If the transmitter test detects a problem, messages to indicate the source of the problem are displayed on the communicator screen.

Loop Test

HART Comm.	1, 2, 2
Model 268	F2, F3

The *Loop Test* command verifies the output of the transmitter, the integrity of the loop, and the operations of any recorders or similar devices installed in the loop. To initiate a loop test, perform the following procedure:

1. Connect a reference meter to the transmitter. To do so, either connect the meter to the test terminals on the transmitter terminal block, or shunt the power to the transmitter through the meter at some point in the loop.
2. From the HOME screen, Select *1 Device Setup*, *2 Diagnostics and Service*, *2 Loop Test*, to prepare to perform a loop test.
3. Select "OK" after you set the control loop to manual (see "Setting the Loop to Manual" on page 2-6).

   The communicator displays the loop test menu.
4. Select a discreet milliamp level for the transmitter to output. At the "Choose analog output" prompt, select *1 4mA*, *2 20mA*, or select *3 other* to manually input a value.

   If you are performing a loop test to verify the output of a transmitter, enter a value between 4 and 20 mA. If you are performing a loop test to verify the transmitter alarm levels, enter the milliamp value at which the transmitter should enter an alarm state (see Tables 2-1 and 2-2 on page 2-3).
5. Check the electrical current meter installed in the test loop to verify that it reads the value you commanded the transmitter to output. If the readings match, the transmitter and the loop are configured and functioning properly. If the readings do not match, there may be a fault in the wiring, the transmitter may require an output trim, or the electrical current meter may be malfunctioning.

After completing the test procedure, the display returns to the loop test screen and allows you to choose another output value or to exit loop testing.

CALIBRATION

Calibrating a smart transmitter is different from calibrating an analog transmitter. The one-step calibration process of an analog transmitter is done in three steps with a smart transmitter:

- Rerange – sets the 4 and 20 mA points at the desired pressures;
- Sensor Trim – Adjusts the position of the factory characterization curve to optimize the transmitter performance over a specified pressure range or to adjust for mounting effects;
- Analog Output Trim – Adjusts the analog output to match the plant standard or the control loop.

To understand the calibration of a Model 3051 smart transmitter, it is necessary to understand that smart transmitters operate differently than analog transmitters. A smart transmitter uses a microprocessor that contains information about the sensor's specific characteristics in response to pressure and temperature inputs; each sensor varies slightly. A smart transmitter compensates for these sensor variations. The process of generating the sensor performance profile is called factory characterization, and it enables a smart transmitter to maintain higher performance specifications than analog transmitters.

It is also important to understand the difference between the trim and the rerange functions of smart transmitters. Reranging sets the transmitter analog output to the selected upper and lower range points, and can be done with or without an applied pressure. Reranging does not change the factory characterization curve stored in the microprocessor. In contrast, sensor trimming requires an accurate pressure input, and adds additional compensation that adjusts the position of the factory characterization curve.

NOTE

Sensor trimming adjusts the position of the factory characterization curve. It is possible to degrade the performance of the transmitter if the sensor trim is done improperly or with equipment that does not meet the accuracy requirements. If you have questions about the calibration process or the trim procedure, contact your local Rosemount representative or call Rosemount Customer Central at 800-999-9307.

TABLE 2-3. Recommended Calibration Tasks.

Transmitter	Bench Calibration Tasks	Field Calibration Tasks
3051CD 3051CG 3051L 3051HD 3051HG	1. Set output configuration parameters: a) Set the transmitter range points. b) Set the Output Units. c) Set the Output Type. d) Set the Damping Value. 2. *Optional:* Perform a Full Sensor Trim -- Accurate pressure source required. 3. *Optional:* Perform an Analog Output Trim -- Accurate multimeter required.	1) Reconfigure parameters if necessary. 2) Zero Trim the transmitter to compensate for mounting position effects or static pressure effects.
3051CA 3051TA 3051TG	1. Set output configuration parameters: a) Set the transmitter range points. b) Set the Output Units. c) Set the Output Type. d) Set the Damping Value. 2. *Optional:* Perform a Full Sensor Trim if equipment available (accurate absolute pressure source required), otherwise perform the Low Trim Value section of Full Sensor Trim procedure. 3. *Optional:* Perform an Analog Output Trim -- Multimeter required.	1) Reconfigure parameters if necessary. 2) Perform Low Trim Value section of Full Sensor Trim procedure to correct for mounting position effects.

NOTES

- *A HART communicator is required for all sensor and output trim procedures.*
- *Model 3051C Range 4 and Range 5 pressure transmitters require a special calibration procedure when used in differential pressure applications under high static line pressure (See "Compensating Model 3051 Range 4 and 5 Differential Pressure Transmitters for Line Pressure" on page 2-21.*
- *Model 3051 TG Range 5 pressure transmitters use an absolute sensor that requires an accurate absolute pressure source to perform the optional full sensor trim.*

Calibration Overview

Complete calibration of the Model 3051 Pressure Transmitter involves the following tasks:

Configure the Analog Output Parameters

- Set Process Variable Units (Page 2-8)
- Set Output Type (Page 2-9)
- Rerange (Page 2-10)
- Set Damping (Page 2-12)

Calibrate the Sensor

- Full Trim (Page 2-19)
- Zero Trim (Page 2-19)

Calibrate the 4–20 mA Output

- 4–20 mA Output Trim (Page 2-20) or
- 4–20 mA Output Trim Using Other Scale (Page 2-20) or
- Low-Power 1–5 V dc or Low-Power 0.8–3.2 V dc (Page 2-20)

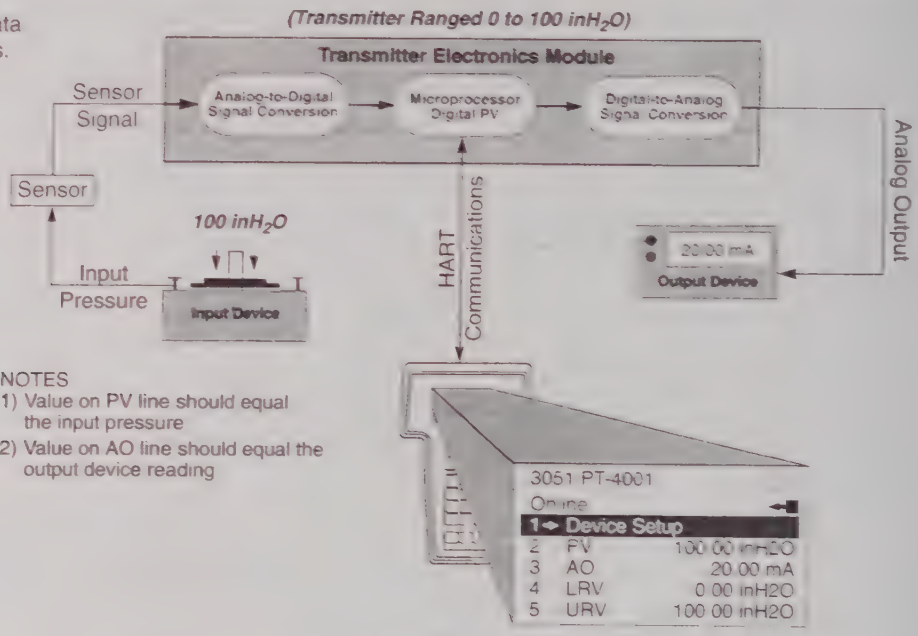
Figure 2-9 illustrates the Model 3051 transmitter data flow. This data flow can be summarized in four major steps:

1. A change in pressure is measured by a change in the sensor output (Sensor Signal).
2. The sensor signal is converted to a digital format that can be understood by the microprocessor (Analog-to-Digital Signal Conversion).
3. Corrections are performed in the microprocessor to obtain a digital representation of the process input (Digital PV).
4. The Digital PV is converted to an analog value (Digital-to-Analog Signal Conversion).

Figure 2-9 also identifies the approximate transmitter location for each calibration task. Note that the data flows from left to right, and a parameter change affects all values to the right of the changed parameter.

Not all calibration procedures should be performed for each Model 3051 transmitter. In addition, some procedures are appropriate for bench calibration, but should not be performed during field calibration. Table 2-3 identifies the recommended calibration procedures for each type of Model 3051 transmitter for both bench and field calibration.

FIGURE 2-9. Transmitter Data Flow with Calibration Options.



Deciding Which Trim Procedure to Use

To decide which trim procedure to use, you must first determine whether the analog-to-digital section or the digital-to-analog section of the transmitter electronics is in need of calibration. To do so, refer to Figure 2-9 and perform the following procedure:

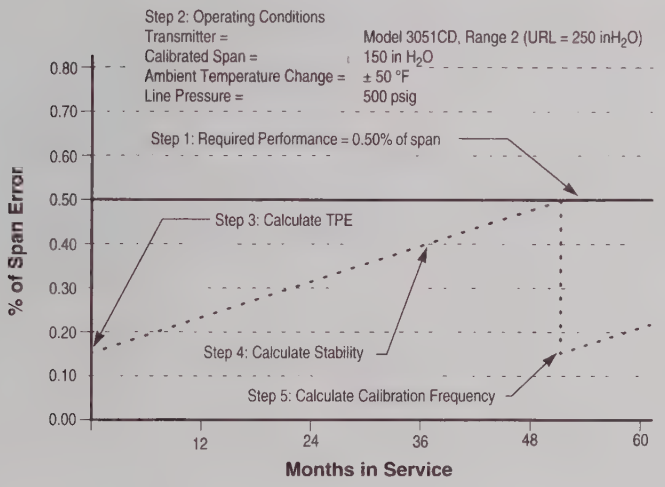
1. Connect a pressure source, a HART communicator, and a digital readout device to the transmitter.
2. Establish communication between the transmitter and the communicator.
3. Apply pressure equal to the upper range point pressure (100 in H_20, for example).
4. Compare the applied pressure to the Process Variable (PV) line on the Communicator Online Menu. If the PV reading on the communicator does not match the applied pressure, and you are confident that your test equipment is accurate, perform a sensor trim.
5. Compare the Analog Output (AO) line on the communicator online menu to the digital readout device. If the AO reading on the communicator does not match the digital readout device, and you are confident that your test equipment is accurate, perform an output trim.

Determining Calibration Frequency

Calibration frequency can vary greatly depending on the application, performance requirements, and process conditions. Use the following procedure to determine the calibration frequency that meets the needs of your application.

1. Determine the performance required for your application.
2. Determine the operating conditions.
3. Calculate the Total Probable Error (TPE).
4. Calculate the stability per month.
5. Calculate the calibration frequency.

FIGURE 2-10. Calculating Calibration Frequency.



SAMPLE CALCULATION

Step 1: Determine the Performance Required for your Application

Required Performance: 0.50% of span

Step 2: Determine the Operating Conditions

Transmitter: Model 3051CD, Range 2 (URL = 250 inH_2O)
Calibrated Span: 150 inH_2O
Ambient Temperature Change: ± 50 °F
Line Pressure: 500 psig

Step 3: Calculate the Total Probable Error (TPE)

$$TPE = \sqrt{(\text{Reference Accuracy})^2 + (\text{Temperature Effect})^2 + (\text{Static Pressure Effect})^2} = \textbf{0.150\% of span}$$

Where:

Reference Accuracy = ± 0.075% of span

Ambient Temperature Effect = $\pm\left[\frac{0.0125 \times URL}{Span} + 0.06125\right]$ per 50 °F = ±0.0833% of span

Span Static Pressure Effect = 0.2% of reading per 1000 psi = ±0.1% of span at maximum span

Step 4: Calculate the Stability per Month

$$\text{Stability} = \pm\left[\frac{(0.25\% \times URL)}{span}\right] \text{ \% of span for 5 years} = \textbf{± 0.007\% of span per month}$$

Step 5: Calculate Calibration Frequency

$$\text{Calibration Frequency} = \frac{(\text{Required Perfromance} - TPE)}{\text{Stability per Month}} = \frac{(0.5\% - 0.150\%)}{0.007\%} = \textbf{50 months}$$

Sensor Trim

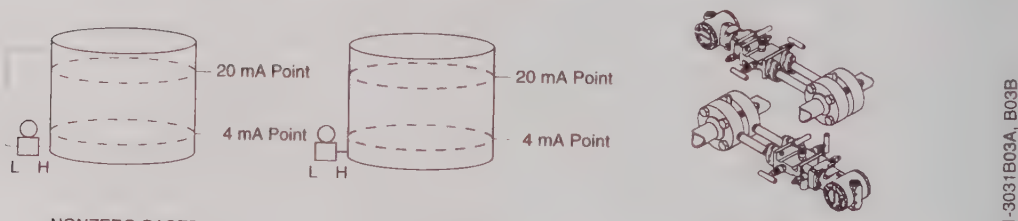
You can trim the sensor using either the full trim or the zero trim function. The trim functions vary in complexity, and their use is application-dependent. Both trim functions alter the transmitter's interpretation of the input signal.

A **zero trim** is a single-point adjustment. It is useful for compensating for mounting position effects, and is most effective when performed with the transmitter installed in its final mounting position. Since this correction maintains the slope of the characterization curve, it should not be used in place of a full trim over the full sensor range.

When performing a zero trim, ensure that the equalizing valve is open and all wet legs are filled to the correct levels.

NOTE

Do not perform a zero trim on Model 3051 Absolute pressure transmitters. A zero trim is zero based, and absolute pressure transmitters reference absolute zero. To correct mounting position effects on a Model 3051 Absolute Pressure Transmitter, perform a low trim within the full sensor trim function. The low trim function provides a "zero" correction similar to the zero trim function but it does not require the input to be zero based.



NONZERO-BASED LEVEL APPLICATION

ZERO-BASED LEVEL APPLICATION

ZERO-BASED FLOW APPLICATION

A **full trim** is a two-point sensor calibration where two end-point pressures are applied, and all output is linearized between them. You should always adjust the low trim value first to establish the correct offset. Adjustment of the high trim value provides a slope correction to the characterization curve based on the low trim value. The factory-established characterization curve is not changed by this procedure. The trim values allow you to optimize performance over your specified measuring range at the calibration temperature.

Zero Trim

HART Comm.	1, 2, 3, 3, 1
Model 268	F3, F2, F1, F3, F2

To calibrate the sensor with a HART Communicator using the zero trim function, perform the following procedure.

1. Vent the transmitter and attach a communicator to the measurement loop.
2. From the communicator main menu select *1 Device setup, 2 Diagnostics and service, 3 Calibration, 3 Sensor trim, 1 Zero trim* to prepare to adjust the zero trim.

NOTE

The transmitter must be within 3% of true zero (zero based) in order to calibrate it using the zero trim function.

3. Follow the commands provided by the communicator to complete the adjustment of the zero trim.

Full Trim

HART Comm.	1, 2, 3, 3
Model 268	F4, F4, F3, F2, F1

To calibrate the sensor with a HART communicator using the full trim function, perform the following procedure.

1. Assemble and power the entire calibration system including a transmitter, HART communicator, power supply, pressure input source, and readout device (see Figure 2-11).

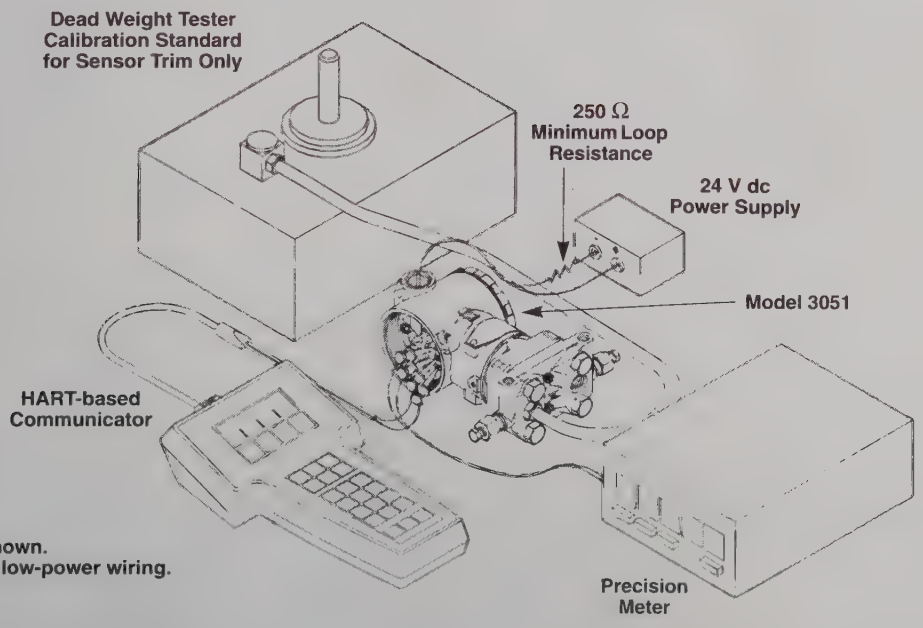
NOTE
Use a pressure input source that is at least three times more accurate than the transmitter, and allow the input pressure to stabilize for 10 seconds before entering any values.

2. From the communicator main menu select *1 Device setup*, *2 Diagnostics and service*, *3 Calibration*, *3 Sensor trim*, *2 Lower sensor trim* to prepare to adjust the lower trim point.

NOTE
Select pressure input values so that the low and high values are equal to or outside the 4 and 20 mA points. Do not attempt to obtain reverse output by reversing the high and low points. The transmitter allows approximately a 5% URL deviation from the characterized curve established at the factory.

3. Follow the commands provided by the communicator to complete the adjustment of the lower value.
4. Repeat the procedure for the upper value, replacing *2 Lower sensor* trim with *3 Upper sensor trim* in Step 2.

FIGURE 2-11. Digital Trim Connection. Drawing (4–20 mA Transmitters).



Analog Output Trim

The Analog Output Trim commands allow you to adjust the transmitter's current output at the 4 and 20 mA points to match the plant standards. This command adjusts the digital to analog signal conversion (see Figure 2-9 on page 2-16).

Digital to Analog Trim

HART Comm.	1, 2, 3, 2, 1
Model 268	F4, F4, F3, F1, F1

To perform a digital-to-analog trim with a HART communicator, perform the following procedure.

1. From the HOME screen, select *1 Device setup, 2 Diag/Service, 3 Calibration, 4 D/A trim*. Select "OK" after you set the control loop to manual (see "Setting the Loop to Manual" on page 2-6).
2. Connect an accurate reference ammeter to the transmitter at the "Connect reference meter" prompt. To do so, connect the positive lead to the positive terminal and the negative lead to the test terminal in the transmitter terminal compartment, or shunt the transmitter power through the reference meter at some point.
3. Select "OK" after connecting the reference meter.
4. Select "OK" at the "Setting fld dev output to 4 mA" prompt.

   The transmitter outputs 4.00 mA.
5. Record the actual value from the reference meter, and enter it at the "Enter meter value" prompt.

   The communicator prompts you to verify whether or not the output value equals the value on the reference meter.
6. Select *1 Yes* if the reference meter value equals the transmitter output value, or *2 No* if it does not.

   If you select *1 Yes*, proceed to Step 7.

   If you select *2 No*, repeat Step 5.
7. Select "OK" at the "Setting fld dev output to 20 mA" prompt, and repeat Steps 5 and 6 until the reference meter value equals the transmitter output value.
8. Select "OK" after you return the control loop to automatic control.

Digital to Analog Trim Using Other Scale

HART Comm.	1, 2, 3, 2, 2
Model 268	F4, F4, F3, F1, F2

The *Scaled D/A Trim* command matches the 4 and 20 mA points to a user-selectable reference scale other than 4 and 20 mA (1 to 5 volts if measuring across a 250 ohm load, or 0 to 100 percent if measuring from a DCS, for example). To perform a scaled D/A trim, connect an accurate reference meter to the transmitter and trim the output signal to scale as outlined in the Output Trim procedure.

NOTE

Use a precision resistor for optimum accuracy. If you add a resistor to the loop, ensure that the power supply is sufficient to power the transmitter to a 20 mA output with the additional loop resistance.

Analog Output Trim (Low-Power)

HART Comm.	1, 2, 3, 2, 1
Model 268	F4, F4, F3, F1, F1

The Model 3051 Low-Power Transmitter has two jumper-selectable output ranges: 1–5 V dc and 0.8–3.2 V dc. Positioning this jumper for the desired output range selects the proper coefficients for temperature corrections. The jumper position also sets the output values (1–5 or 0.8–3.2) which are communicated through HART protocol and accessed by a hand held communicator.

However, switching this jumper does not by itself select the new outputs; you must perform the Digital to Analog Trim procedure on page 2-20 to match the transmitter's output voltages to the new jumper selection.

Compensating Model 3051 Range 4 and 5 Differential Pressure Transmitters for Line Pressure

Model 3051 Range 4 and Range 5 pressure transmitters require a special calibration procedure when used in differential pressure applications. The purpose of this procedure is to optimize transmitter performance by reducing the effect of static line pressure in these applications. Model 3051 differential pressure transmitters (Ranges 1, 2, and 3) do not require this procedure because the optimization occurs in the sensor.

Applying high static pressure to Model 3051 Range 4 and Range 5 pressure transmitters causes a systematic shift in the output. This shift is linear with static pressure; correct it by performing the Full Trim procedure on page 2-19.

The following specifications show the static pressure effect for Model 3051 Range 4 and Range 5 transmitters used in differential pressure applications:

Zero Effect: ±0.1% of the upper range limit per 1,000 psi (6.9 MPa) for line pressures from 0 to 2,000 psi (0 to 13.8 MPa).
±0.2% of the upper range limit per 1,000 psi (6.9 MPa) for line pressures above 2,000 psi (13.8 MPa).

Span Effect: Correctable to ±0.2% of reading per 1,000 psi for line pressures from 0 to 3,626 psi.

The systematic span shift caused by the application of static line pressure is –1.00% of reading per 1,000 psi for 3051C Range 4 transmitters, and –1.25% of reading per 1,000 psi for Range 5 transmitters.

Use the following example to compute corrected input values.

Example

A transmitter with model number 3051CD4 will be used in a differential pressure application where the static line pressure is 1,200 psi. The transmitter is ranged so that the output is 4 mA at 500 inH_2O and 20 mA at 1,500 inH_2O.

To correct for systematic error caused by high static line pressure, first use the following formulas to determine corrected values for the low trim and high trim.

LT = LRV + S (LRV) P

Where: LT = Corrected Low Trim Value
LRV = Lower Range Value
S = –(Span shift per specification)
P = Static Line Pressure

HT = URV + S (URV) P

Where: HT = Corrected High Trim Value
URV = Upper Range Value
S = –(Span shift per specification)
P = Static Line Pressure

In this example:

URV = 1,500 inH_2O
LRV = 500 inH_2O
P = 1,200 psi
S = +0.01/1,000

To calculate the low trim (LT) value:

LT = 500 + (0.01/1,000)(500)(1,200)
LT = 506 inH_2O

To calculate the high trim (HT) value:

HT= 1,500 + (0.01/1,000)(1,500)(1,200)
HT= 1,518 inH_2O

To complete a Model 3051 full trim and enter the corrected values for low trim (LT) and high trim (HT), refer to Page 2-19.

Enter the corrected input values for low trim and high trim through the communicator keypad after you apply the nominal value of pressure as the transmitter input.

NOTE
After calibrating Model 3051 Range 4 and Range 5 transmitters for high differential pressure applications, rerange the 4 and 20 mA points using the communicator to maintain the systematic static line pressure correction. You may re-zero the 4 mA point at line pressure after installation using the local zero button without affecting the completed calibration.

ADVANCED FUNCTIONS

Saving, Recalling, and Cloning Configuration Data

HART Comm.	left arrow, 1, 2
Model 268	F4, F3, F1

Use the cloning feature of the Model 275 HART Communicator if you need to configure several Model 3051 transmitters similarly. The cloning process involves configuring a transmitter, saving the configuration data, then sending a copy of the data to a separate transmitter. There are a number of possible procedures to use when saving, recalling, and cloning configuration data. For complete instructions refer to the HART Communicator manual, publication no. 00809-0100-4275. One common method is as follows:

1. Completely configure the first transmitter.
2. Save the configuration data:
   a. Select F2 Save from the communicator Home/Online screen.
   b. Ensure that the location to which the data will be saved is set to *Module*. If it is not, select *1 Location* to set the save location to module.
   c. Select *2 Name* to name the configuration data. The default is the transmitter tag number.
   d. Ensure that the data type is set to *standard*. If it is not, select *3 Data Type* to set the data type to standard.
   e. Select F2 Save.
3. Connect and power the receiving transmitter and communicator.
4. Select the back arrow from the Home/Online screen. The HART Communicator menu appears.
5. Select *1 Offline*, *2 Saved Configuration*, *1 Module Contents* to reach the Module Contents menu.
6. Use the down arrow to scroll through the list of configurations in the memory module, and use the right arrow to select the configuration you wish to retrieve.
7. Select *1 Edit*.
8. Select *1 Mark All*.
9. Select F2 Save.
10. Use the down arrow to scroll through the list of configurations in the memory module, and use the right arrow to select the configuration again.
11. Select *3 Send* to download the configuration to the transmitter.

When finished, the communicator informs you of the status. To configure another transmitter, repeat Steps 3 through 10.

NOTE
The transmitter receiving the cloned data must have the same or a newer version of the software than the original transmitter.

Burst Mode

HART Comm.	1, 4, 3, 3, 3
Model 268	F4, F4, F4, F1

When configured for burst mode, the Model 3051 provides faster digital communication from the transmitter to the control system by eliminating the time required for the control system to request information from the transmitter. Burst mode is compatible with use of the analog signal. Because HART protocol features simultaneous digital and analog data transmission, the analog value can drive other equipment in the loop while the control system is receiving the digital information. Burst mode applies only to the transmission of dynamic data (pressure and temperature in engineering units, pressure in percent of range, and/or analog output), and does not affect the way other transmitter data is accessed.

Access to information other than dynamic transmitter data is obtained through the normal poll/response method of HART communication. A HART-based communicator or the control system may request any of the information that is normally available while the transmitter is in burst mode. Between each message sent by the transmitter, a short pause allows the HART-based communicator or a control system to initiate a request. The transmitter will receive the request, process the response message, and then continue "bursting" the data approximately three times per second.

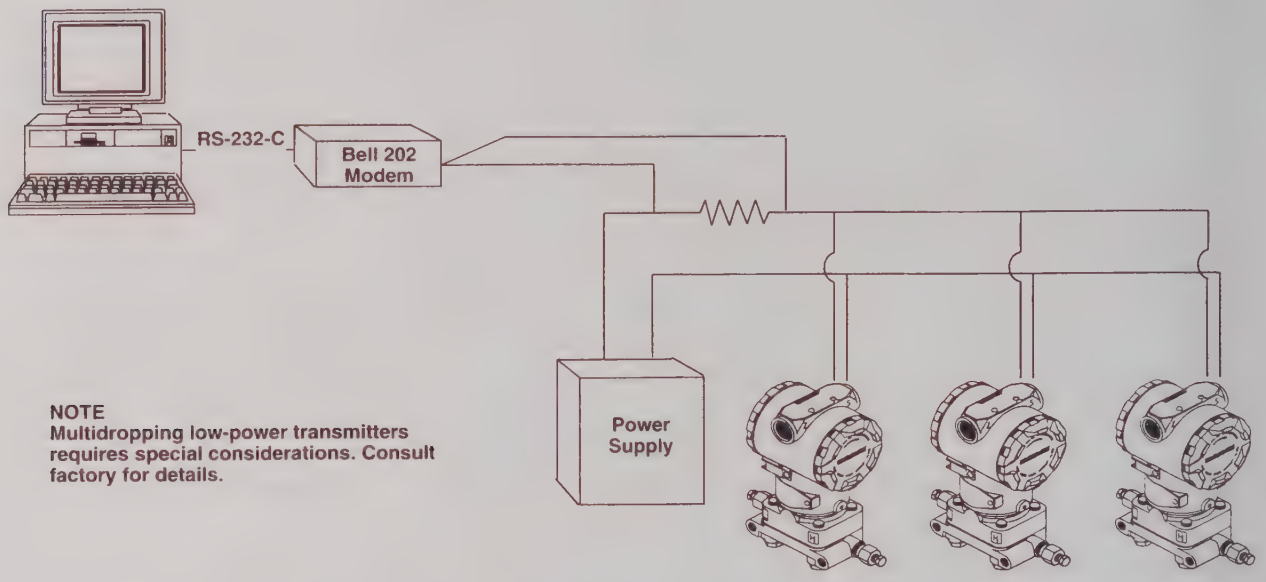
Multidrop Communication

Multidropping transmitters refers to the connection of several transmitters to a single communications transmission line. Communication between the host and the transmitters takes place digitally with the analog output of the transmitters deactivated. Many of the Rosemount SMART FAMILY transmitters can be multidropped. With the HART smart communications protocol, up to 15 transmitters can be connected on a single twisted pair of wires or over leased phone lines. This feature can greatly reduce wiring costs.

The application of a multidrop installation requires consideration of the update rate necessary from each transmitter, the combination of transmitter models, and the length of the transmission line. Multidrop installations are not recommended where intrinsic safety is a requirement. Communication with the transmitters can be accomplished with commercially available Bell 202 modems and a host implementing the HART protocol. Each transmitter is identified by a unique address (1-15) and responds to the commands defined in the HART protocol. HART-based communicators can test, configure, and format a multidropped transmitter the same way as a transmitter in a standard point-to-point installation.

Figure 2-12 on page 2-24 shows a typical multidrop network. This figure is not intended as an installation diagram. Contact Rosemount product support with specific requirements for multidrop applications.

FIGURE 2-12. Typical Multidrop Network.



NOTE
Multidropping low-power transmitters requires special considerations. Consult factory for details.

NOTE
The Model 3051 is set to address 0 at the factory, allowing it to operate in the standard point-to-point manner with a 4–20 mA output signal. To activate multidrop communication, the transmitter address must be changed to a number from 1 to 15. This change deactivates the 4–20 mA analog output, sending it to 4 mA. It also disables the failure mode alarm signal, which is controlled by the upscale/downscale jumper position. Failure signals in multidropped transmitters are communicated through HART messages.

Changing a Transmitter Address

HART Comm.	1, 4, 3, 3, 1
Model 268	F1, F4, F4, F2, F3

To change the address of a multidropped transmitter, follow these fast key sequences. To activate multidrop communication, the transmitter address must be changed to a number from 1 to 15, and each transmitter in a multidropped loop must have a unique address.

Communicating with a Multidropped Transmitter

HART Comm.	1, 4, 3, 3, 2
Model 268	F1, F4, F4, F2, F2

To communicate with a multidropped transmitter for the purpose of testing, configuring, or formatting.

Polling a Multidropped Loop

HART Comm.	Left Arrow, 4, 1 (note)
Model 268	F1, F4, F4, F2, F3

Polling a multidropped loop determines the model, address, and number of transmitters on the given loop.

NOTE
The HART Communicator Model 275 requires you to use the Utility Menu to perform an auto poll. This menu is available from the Main Menu of the HART Communicator. Press the left arrow to move from the Online Menu to the Main Menu. Press 4 from the Main Menu to access the Utility Menu.

Section 3

Installation

OVERVIEW

This section is designed to guide you through a successful Model 3051 transmitter installation. Starting with an installation flowchart, this section contains information on installation considerations and Model 3051 options. Dimensional drawings for each Model 3051 variation and mounting configuration are also included in this section.

SAFETY MESSAGES

Procedures and instructions in this section may require special precautions to ensure the safety of the personnel performing the operations. Information that raises potential safety issues is indicated by a warning symbol (⚠). Refer to the following safety messages before performing an operation preceded by this symbol.

Warnings (⚠)

⚠WARNING

Explosions can result in death or serious injury.

- Do not remove the transmitter covers in explosive environments when the circuit is alive.
- Both transmitter covers must be fully engaged to meet explosion-proof requirements.
- Before connecting a communicator in an explosive atmosphere, make sure the instruments in the loop are installed in accordance with intrinsically safe or non-incendive field wiring practices.
- Verify that the operating atmosphere of the transmitter is consistent with the appropriate hazardous locations certifications.

⚠WARNING

Electrical shock can result in death or serious injury.

- Avoid contact with the leads and the terminals.

⚠WARNING

Process leaks could result in death or serious injury.

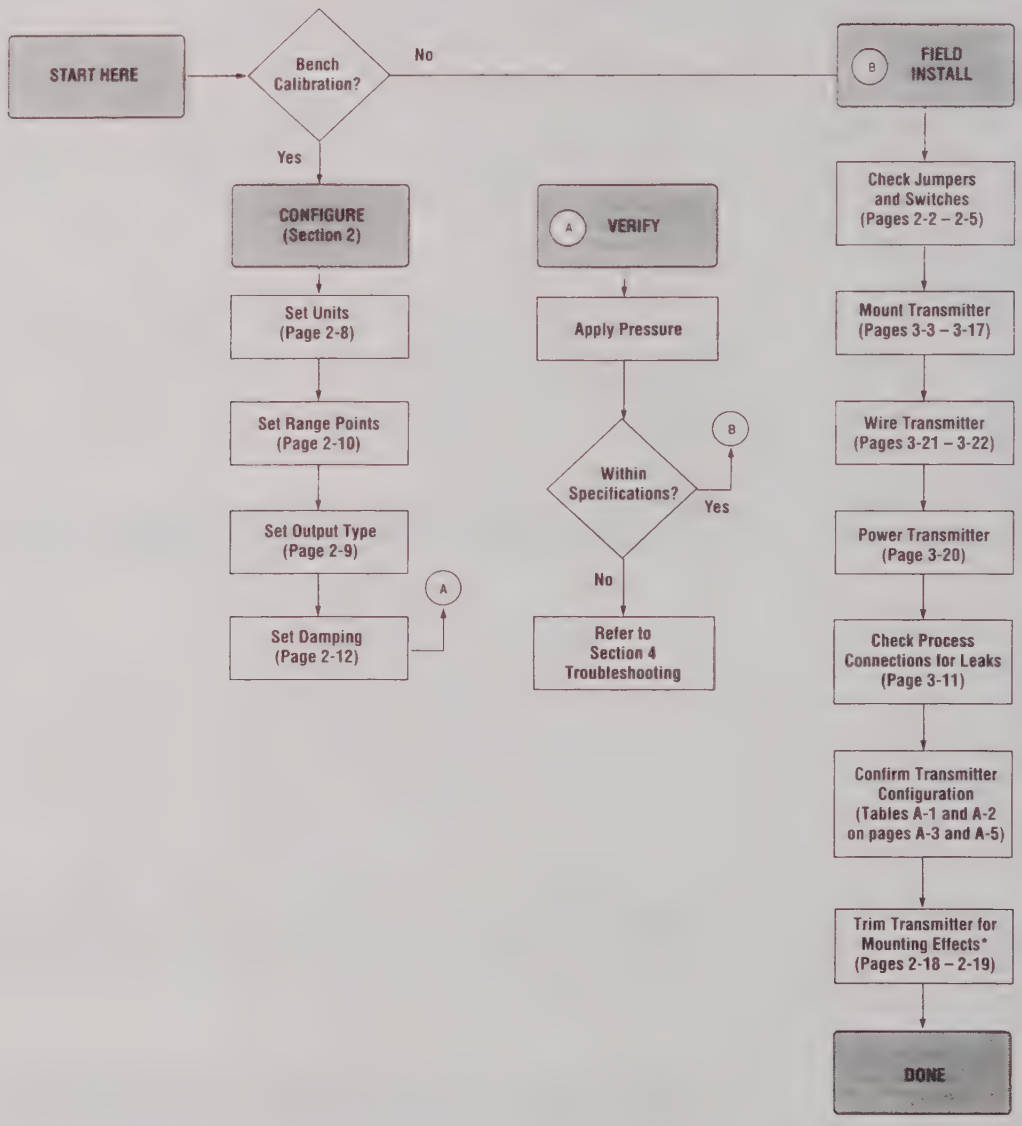
- Install and tighten all four flange bolts before applying pressure.
- Do not attempt to loosen or remove the flange bolts while the transmitter is in service.

⚠WARNING

Replacement equipment or spare parts not approved by Rosemount Inc. for use as spare parts could reduce the pressure retaining capabilities of the transmitter and may render the instrument dangerous.

- Only use bolts supplied with the Model 3051 or sold by Rosemount Inc. as spare parts for the Model 3051.

FIGURE 3-1. Installation Flowchart.



*** Refer to Page 2-18 for details on performing a sensor trim on the Model 3051CA and Model 3051TA pressure transmitters.**

GENERAL CONSIDERATIONS

The accuracy of a flow, pressure, or level measurement depends to a great extent on proper installation of the transmitter and impulse piping. The piping between the process and transmitter must accurately transmit process pressure to the transmitter. Mount the transmitter close to the process and use a minimum of piping to achieve best accuracy. Keep in mind, however, the need for easy access, safety of personnel, practical field calibration, and a suitable transmitter environment. In general, install the transmitter to minimize vibration, shock, and temperature fluctuations.

IMPORTANT

Install the enclosed pipe plug in unused conduit openings with a minimum of five threads engaged to comply with explosion proof requirements. The transmitter is shipped with the plug installed on transmitters ordered with a CSA explosion proof approval.

MECHANICAL CONSIDERATIONS

Optional Mounting brackets allow Rosemount Model 3051 transmitters to be mounted in any of a number of configurations. Figures 3-2 through 3-8 on pages 3-4 through 3-7 show dimensional drawings for the different types of Model 3051 transmitters. Figure 3-10 on page 3-10 shows installation examples. Figures 3-11 through 3-15 on pages 3-13 through 3-16 show dimensional drawings of the mounting brackets.

NOTE

For steam service, do not blow down impulse piping through the transmitter. Flush the lines with the blocking valves closed and refill the lines with water before resuming measurement.

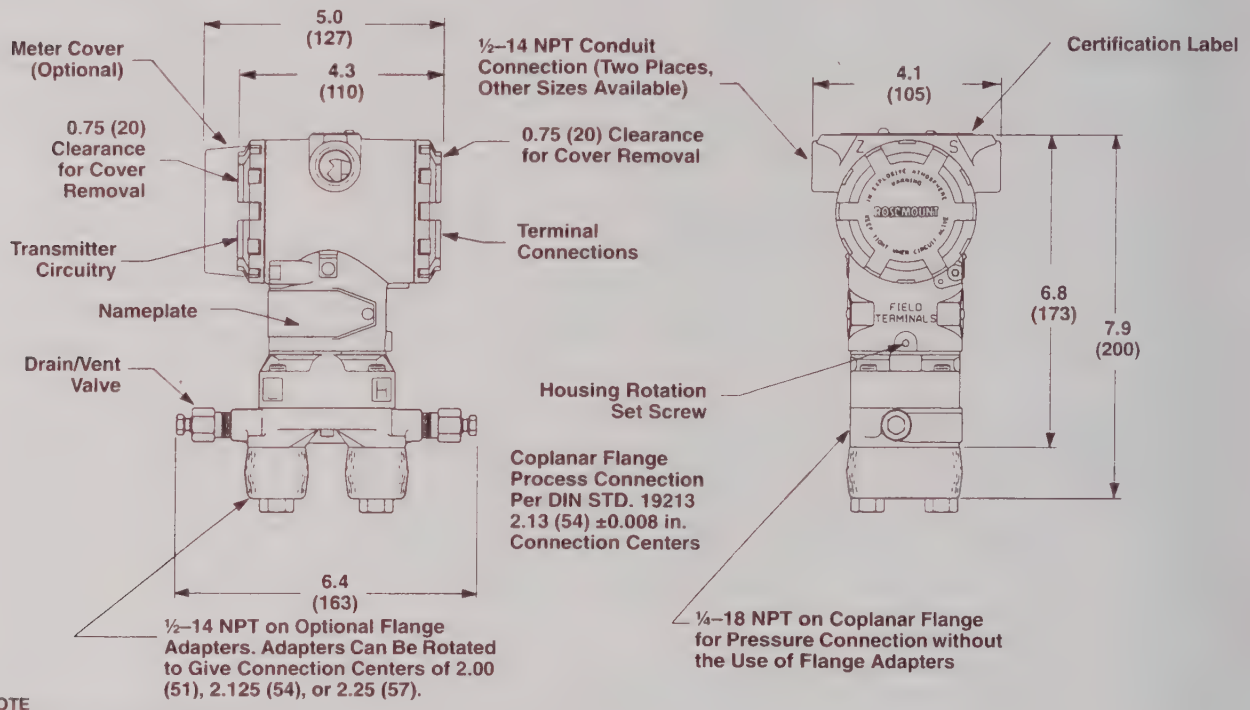
NOTE

If you mount the transmitter on its side, place the Coplanar™ flange to ensure proper venting or draining. Mount the flange as shown in Figure 3-10 on page 3-10 so that the drain/vent connections are on the bottom half of the flange for gas service, or on the top half of the flange for liquid service.

NOTE

The Model 3051 pressure transmitter incorporates two independent seals between the process connection and the conduit connection.

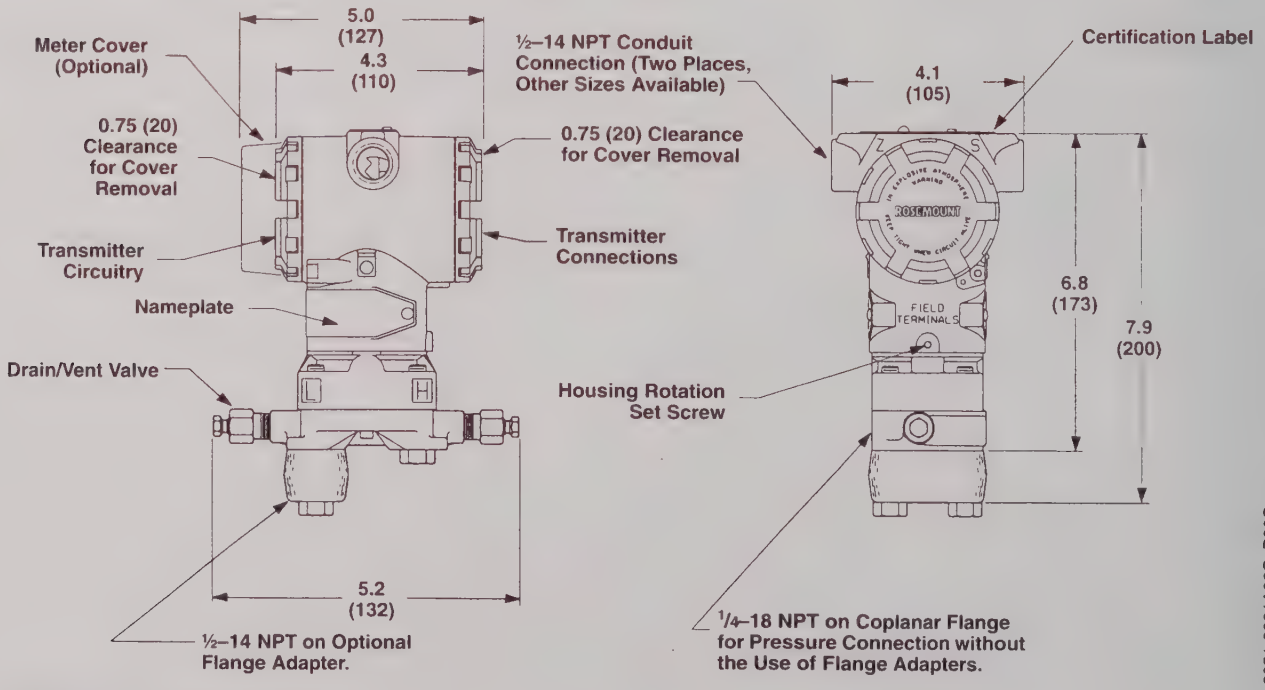
FIGURE 3-2. Model 3051CD
Dimensional Drawings.



3051-3031A06A, B06A

NOTE
Dimensions are in inches (millimeters).

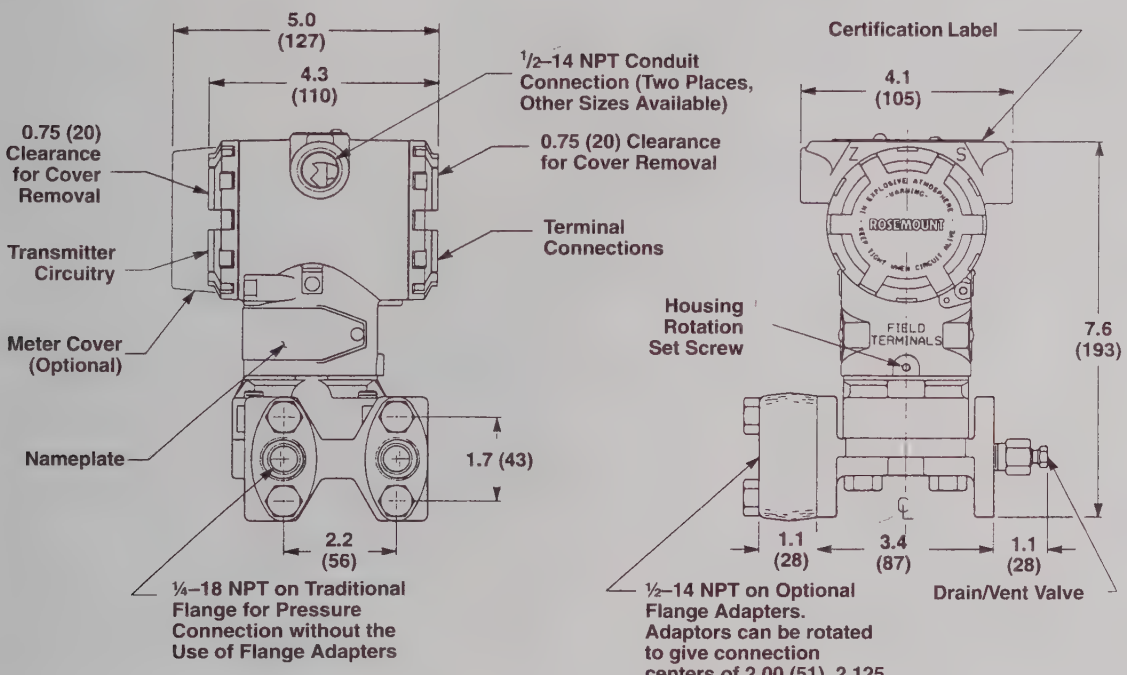
FIGURE 3-3. Model 3051CG and CA
Dimensional Drawings.



3051-3031A06C, B06C

NOTE
Dimensions are in inches (millimeters).

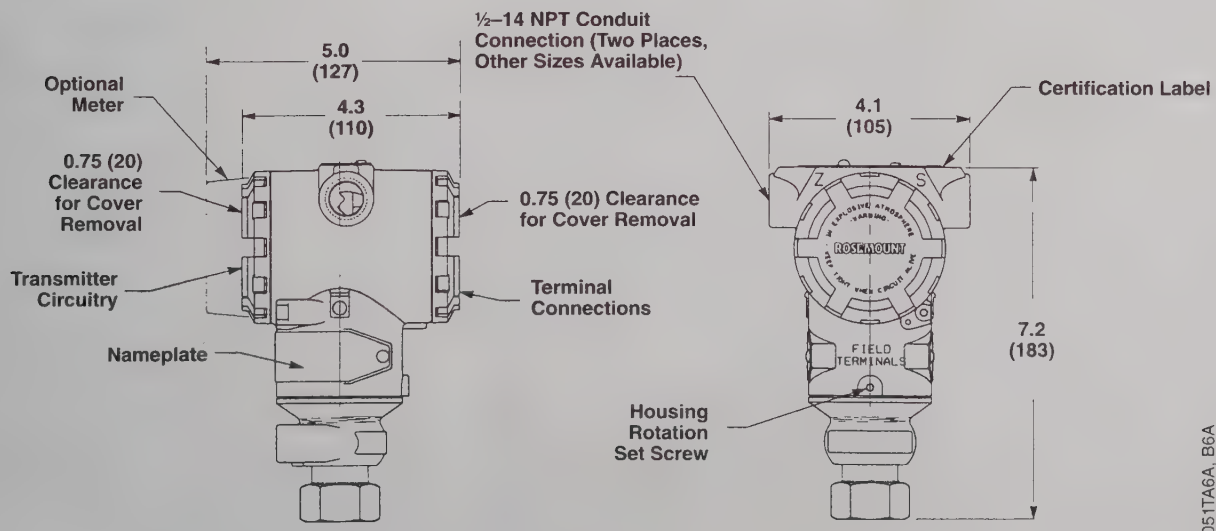
FIGURE 3-4. Model 3051C (Traditional Flange) Dimensional Drawings.



NOTE
Dimensions are in inches (millimeters).

3051-3051D30A, E30A

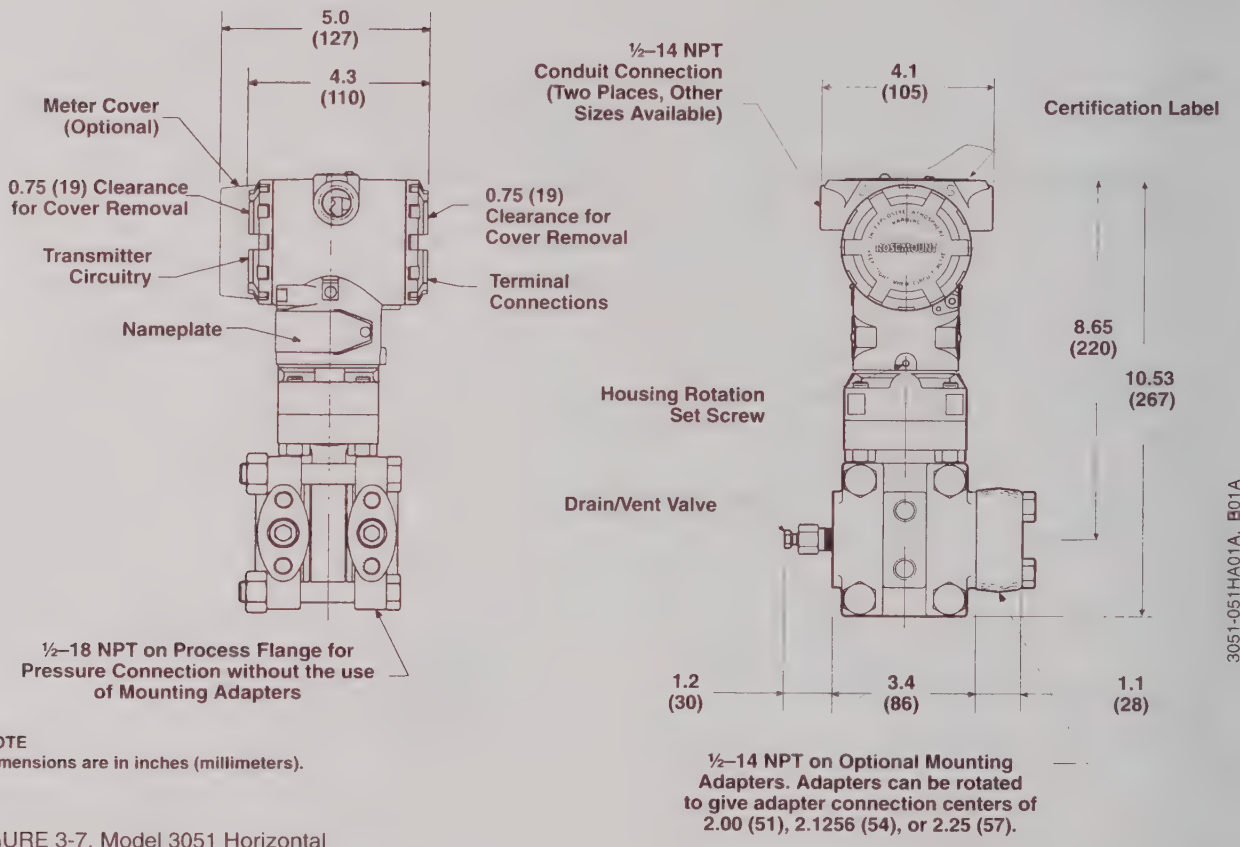
FIGURE 3-5. Model 3051T Dimensional Drawings.



NOTE
Dimensions are in inches (millimeters).

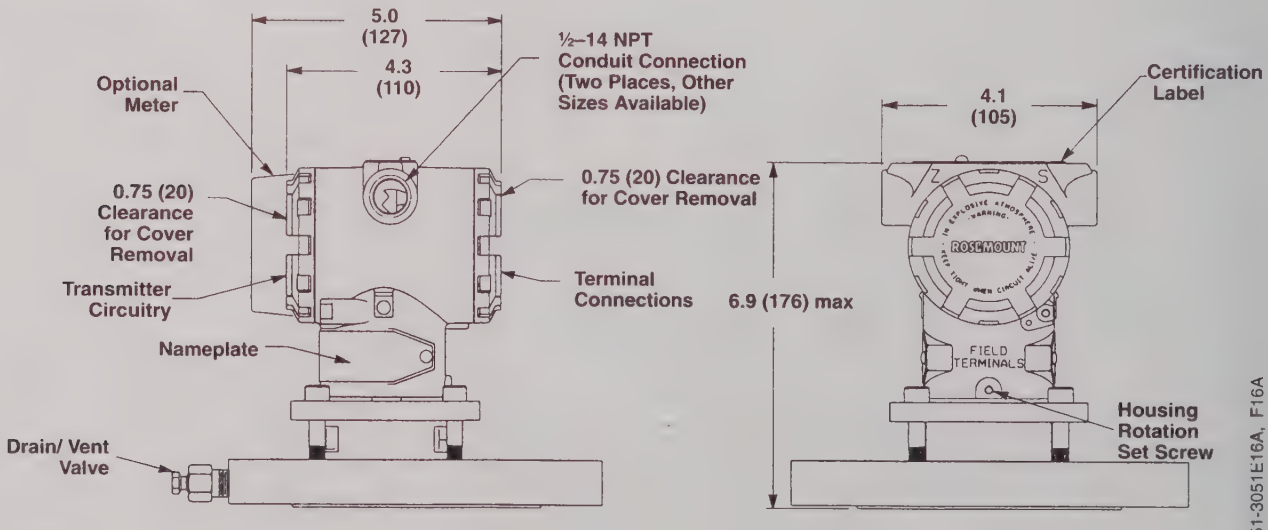
3051-3051TA6A, B6A

FIGURE 3-6. Model 3051H Dimensional Drawings.



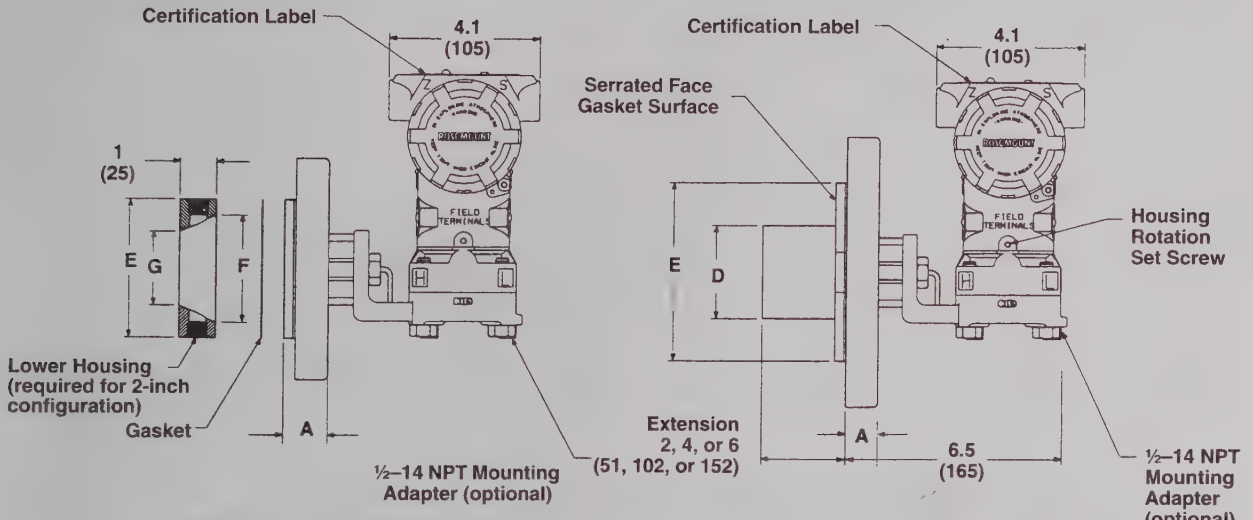
NOTE
Dimensions are in inches (millimeters).

FIGURE 3-7. Model 3051 Horizontal Level Flange Dimensional Drawings.



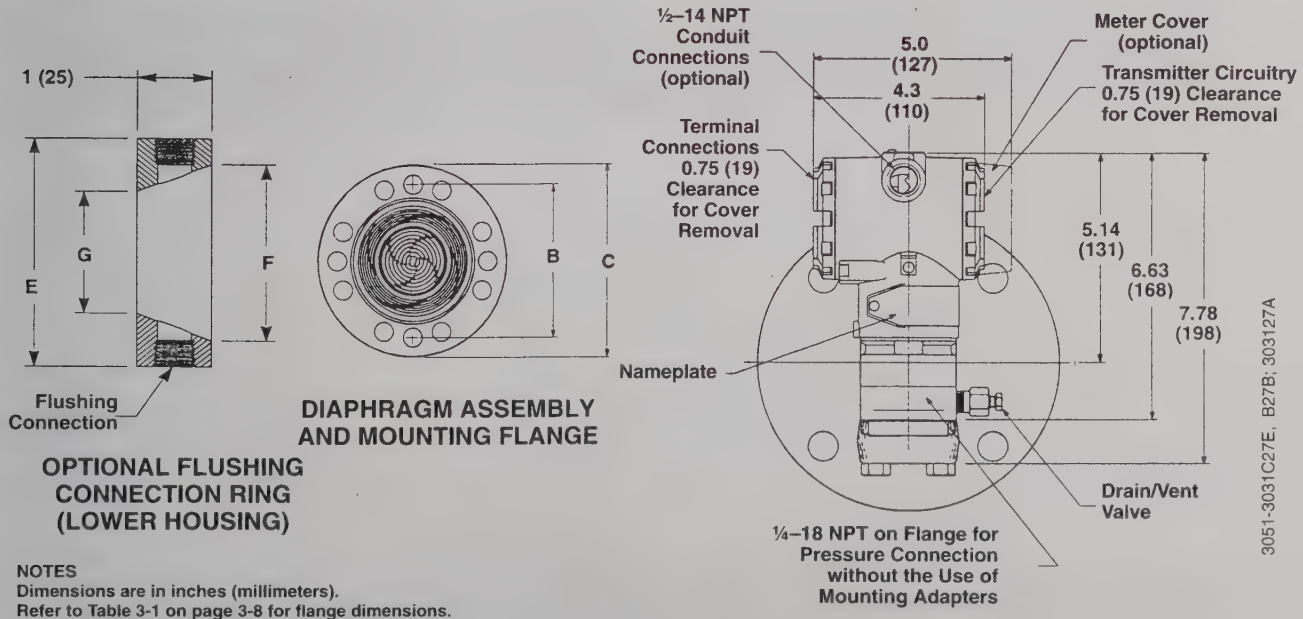
NOTE
Dimensions are in inches (millimeters).

FIGURE 3-8. Model 3051L
Dimensional Drawings.



NOTES
Dimensions are in inches (millimeters).
Refer to Table 3-1 on page 3-8 for flange dimensions.

3051-303127C, 27B

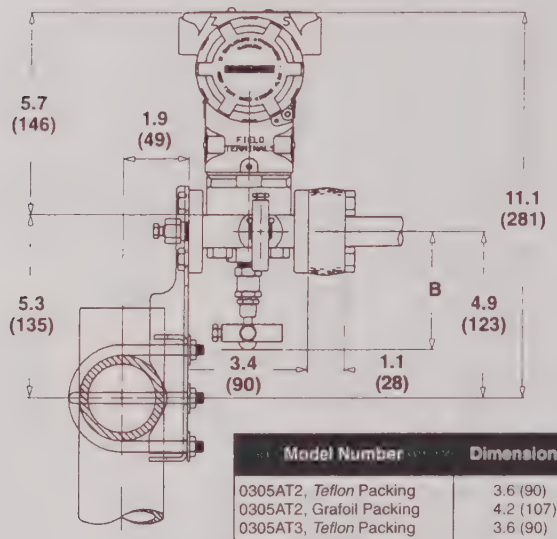


NOTES
Dimensions are in inches (millimeters).
Refer to Table 3-1 on page 3-8 for flange dimensions.

3051-3031C27E, B27B; 303127A

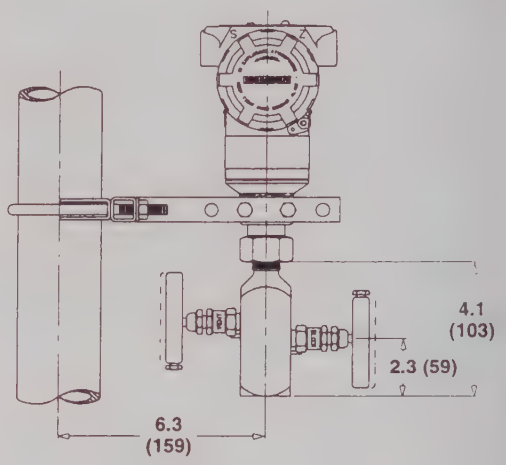
FIGURE 3-9. Typical Mounting Configurations for Model 3051 Transmitters with Models 305 and 306 Manifolds.

Model 3051C with Model 305 Manifold and Option Code B3/B9/BC Mounting Bracket



Model Number	Dimension B
0305AT2, *Teflon* Packing	3.6 (90)
0305AT2, Grafoil Packing	4.2 (107)
0305AT3, *Teflon* Packing	3.6 (90)
0305AT3, Grafoil Packing	4.2 (107)
0305AT7, (ANSI B31.1)	4.2 (107)
0305AT8, (ANSI B31.1)	4.2 (107)

Model 3051T with Model 306 Manifold and Option Code B4 Mounting Bracket



3051-305--3031119A, 3051D04A

NOTE
Dimensions are in inches (millimeters).

TABLE 3-1. Model 3051L Dimensional Specifications.

Class	Pipe Size	Flange Thickness A	Bolt Circle Diameter B	Outside Diameter C	No. of Bolts	Bolt Hole Diameter	Exten. Diam. D (1)	O.D. Gask. Surf. E	Lower Housing	
									Xmtr Side F	Proc. Side G
ANSI 150	2 (51)	1.12 (28)	4.75 (121)	6.0 (152)	4	0.75 (19)	NA	3.75 (95)	2.9 (74)	2.16 (55)
	3 (76)	1.31 (33)	6.0 (152)	7.5 (190)	4	0.75 (19)	2.58 (65)	5.0 (127)	3.11 (79)	3.11 (79)
	4 (102)	1.31 (33)	7.5 (190)	9.0 (228)	8	0.75 (19)	3.5 (89)	6.81 (173)	4.06 (103)	4.06 (103)
ANSI 300	2 (51)	1.25 (32)	5.0 (127)	6.5 (165)	8	0.75 (19)	NA	3.75 (95)	2.9 (74)	2.16 (55)
	3 (76)	1.50 (38)	6.62 (168)	8.25 (209)	8	0.88 (22)	2.58 (65)	5.0 (127)	3.11 (79)	3.11 (79)
	4 (102)	1.62 (41)	7.88 (200)	10.0 (254)	8	0.88 (22)	3.5 (89)	6.81 (173)	4.06 (103)	4.06 (103)
ANSI 600	2 (51)	1.12 (28)	5.0 (127)	6.5 (165)	8	0.75 (19)	NA	3.75 (95)	2.9 (74)	2.16 (55)
	3 (76)	1.37 (35)	6.62 (168)	6.62 (168)	8	0.88 (22)	2.58 (65)	5.0 (127)	3.11 (79)	3.11 (79)
DIN PN10-40	DN 50	26 mm	125 mm	165 mm	4	18 mm	NA	95 mm	74 mm	55 mm
DIN PN 25/40	DN 80	30 mm	160 mm	200 mm	8	18 mm	65 mm	127 mm	79 mm	79 mm
	DN 100	30 mm	190 mm	235 mm	8	22 mm	89 mm	173 mm	103 mm	103 mm
DIN PN 10/16	DN 100	26 mm	180 mm	220 mm	8	18 mm	89 mm	173 mm	103 mm	103 mm

(1) Tolerances are 0.040 (1.02), –0.020 (0.51).

NOTE
Except where indicated, dimensions are in inches (millimeters).

Mounting

The Model 3051C Pressure Transmitter weighs 5.5 pounds (2.5 kg) without additional options. Optional mounting brackets available with the Model 3051 allow mounting to a panel, wall, or 2-inch pipe. The B4 bracket option for use with the Coplanar flange and the Model 3051T is 316 SST with 316 SST bolts. Figures 3-11 and 3-12 on pages 3-13 and 3-14 show bracket dimensions and mounting configurations for the B4 option.

Bracket options B1, B2, B3, B7, B8, and B9 are sturdy, polyurethane painted carbon steel brackets designed for use in pipe or panel mounting the traditional flange (H2, H3, H4, or H7 option). The B1–B3 brackets have carbon steel bolts, while the B7–B9 brackets have stainless steel bolts. Bracket options BA and BC are stainless steel with stainless steel bolts. Dimensionally, these brackets are identical to the B1–B3 brackets used with the Rosemount Model 1151 Pressure Transmitter except for the length of the bolts used to mount the transmitter to the bracket. Bracket options B5/B6 are used for Model 3051H transmitters. These bracket styles facilitate multiple mounting configurations (see Figures 3-13 and 3-14 on page 3-15). When installing the transmitter to one of the mounting brackets, torque the bolts to 125 inch-pounds.

NOTE
The transmitter is calibrated in an upright position at the factory. If you mount the transmitter in any other position, the zero point will shift by an amount equivalent to the liquid head caused by the varied mounting position. To reset the zero point, refer to "Sensor Trim" on Page 2-18.

Mounting Requirements

Refer to Figure 3-10 for examples of the following mounting configurations:

Liquid Flow Measurement

- place taps to the side of the line to prevent sediment deposits on the transmitter's process isolators,
- mount the transmitter beside or below the taps so gases can vent into the process line,
- mount drain/vent valve upward to allow gases to vent.

Gas Flow Measurement

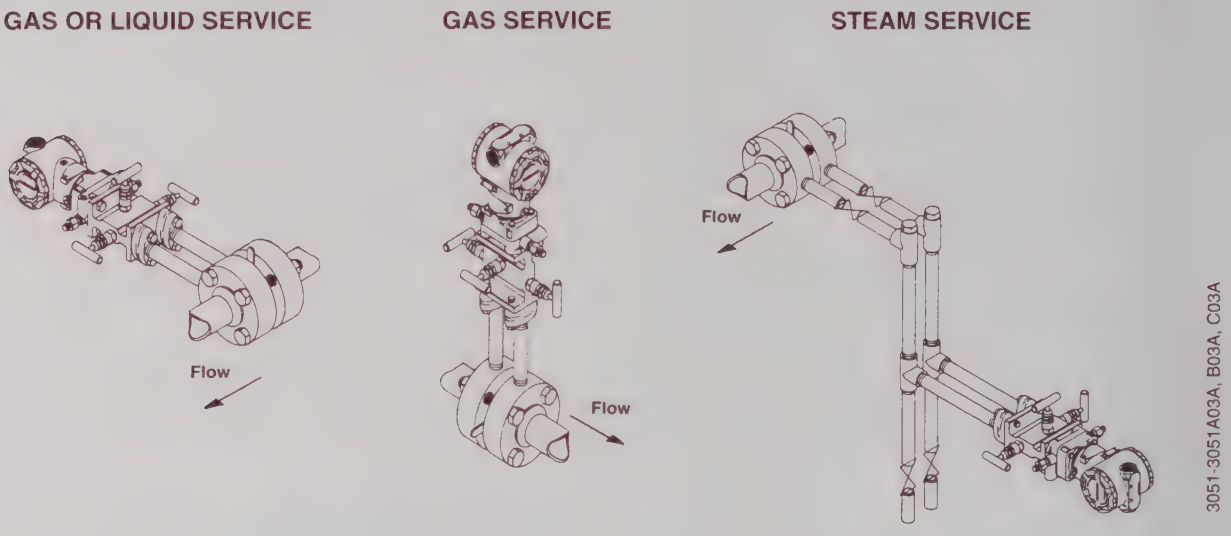
- place taps in the top or side of the line,
- mount the transmitter beside or above the taps so liquid will drain into the process line.

Steam Flow Measurement

- place taps to the side of the line,
- mount the transmitter below the taps to ensure that the impulse piping will stay filled with condensate,
- fill impulse lines with water to prevent the steam from contacting the transmitter directly and to ensure accurate measurement start-up.

NOTE
In steam or other elevated temperature services, it is important that temperatures at the coplanar process flanges not exceed 250 °F (121 °C) for transmitters with silicone fill or 185 °F (85 °C) for inert fill. In vacuum service, these temperature limits are reduced to 220 °F (104 °C) for silicone fill and 160 °F (71 °C) for inert fill. Models 3051L, 3051H, and the traditional flange allow higher temperatures.

FIGURE 3-10. Installation Examples.



Impulse Piping

The piping between the process and the transmitter must accurately transfer the pressure to obtain accurate measurements. There are five possible sources of error: pressure transfer, leaks, friction loss (particularly if purging is used), trapped gas in a liquid line, liquid in a gas line, and density variations between the legs.

The best location for the transmitter in relation to the process pipe depends on the process itself. Use the following guidelines to determine transmitter location and placement of impulse piping:

- Keep impulse piping as short as possible.
- Slope the impulse piping at least 1 in. per ft. (8 cm per m) upward from the transmitter toward the process connection for liquid.
- Slope the impulse piping at least 1 in. per ft. (8 cm per m) downward from the transmitter toward the process connection for gas.
- Avoid high points in liquid lines and low points in gas lines.
- Make sure both impulse legs are the same temperature.
- Use impulse piping large enough to avoid friction effects and prevent blockage.
- Vent all gas from liquid piping legs.
- When using a sealing fluid, fill both piping legs to the same level.
- When purging, make the purge connection close to the process taps and purge through equal lengths of the same size pipe. Avoid purging through the transmitter.
- Keep corrosive or hot (above 250 °F [121 °C]) process material out of direct contact with the sensor module and flanges.
- Prevent sediment deposits in the impulse piping.
- Keep the liquid head balanced on both legs of the impulse piping.
- Avoid conditions that might allow process fluid to freeze within the process flange.

Process Connections

Model 3051 process connections on the transmitter flange are ¼–18 NPT. Flange adapter unions with ½–14 NPT connections are supplied as standard. The threads are Class 2; use your plant-approved lubricant or sealant when making the process connections. The process connections on the transmitter flange are on 2⅛-inch (54 mm) centers to allow direct mounting to a three-valve or five-valve manifold. Rotate one or both of the flange adapters to attain connection centers of 2 inches (51 mm), 2⅛ inches (54 mm), or 2¼ inches (57 mm).
See Page 3-12 for information on the Model 3051T process connection.

⚠ Install and tighten all four flange bolts before applying pressure, or process leakage will result. When properly installed, the flange bolts will protrude through the top of the module housing. Do not attempt to loosen or remove the flange bolts while the transmitter is in service.

To install adapters to a coplanar flange, perform the following procedure:

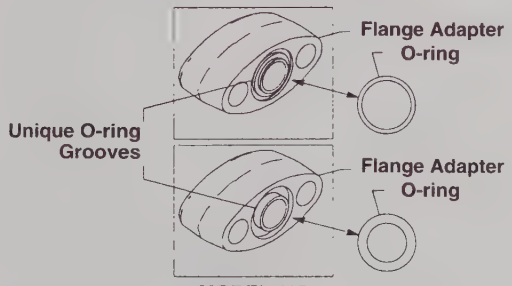
1. Remove the flange bolts.
2. Leaving the flange in place, move the adapters into position with the o-ring installed.
3. Clamp the adapters and the coplanar flange to the transmitter module using the larger of the bolts supplied.
4. Tighten the bolts. Refer to "Mounting Bolts" on Page 3-17 for torque specifications.

⚠WARNING

Failure to install proper flange adapter O-rings can cause process leaks, which can result in death or serious injury.

There are two styles of Rosemount flange adapters, each requiring a unique O-ring, as shown below. Each flange adapter is distinguished by its unique groove.

MODEL 3001/3051/2024/3095



MODEL 1151

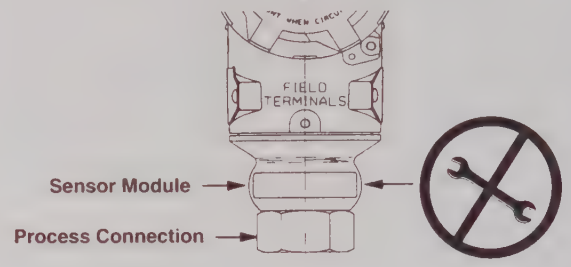
Use only the O-ring designed to seal with the corresponding flange adapter. Refer to the Spare Parts List on Pages 5-32 and 5-33 for the correct part numbers of the flange adapters and O-rings designed for the Model 3051 Pressure Transmitters.

When compressed, Teflon® O-rings tend to cold flow, which aids in their sealing capabilities. Whenever you remove flanges or adapters, visually inspect the Teflon O-rings. Replace them if there are any signs of damage, such as nicks or cuts. If they are undamaged, you may reuse them. If the you replace the O-rings, retorque the flange bolts after installation to compensate for cold flow. Refer to the process sensor body reassembly procedure in Section–4 Troubleshooting.

Model 3051T Process Connection

⚠CAUTION

Do not apply torque directly to the sensor module. Rotation between the sensor module and the process connection can damage the electronics. To avoid damage, apply torque only to the hex-shaped process connection.

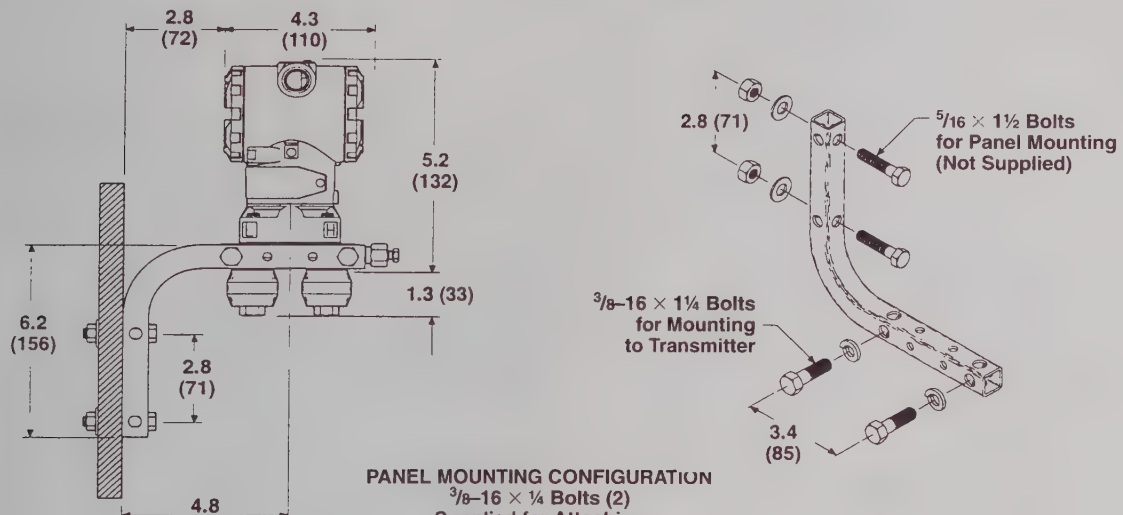


Housing Rotation

You can rotate the electronics housing up to 180 degrees (left or right) to improve field access to the two compartments or to better view the optional LCD meter. To rotate the housing, release the housing rotation set screw using a 9/64 - inch hex wrench, and turn the housing not more than 180 degrees from the orientation shown in Figure 3-2 on page 3-4. To rotate the housing greater than 180 degrees, follow Steps 1–6 of the disassembly procedure in Section–4 Troubleshooting. **Do not rotate the housing more than 180 degrees without first performing the disassembly procedure. Over-rotation will sever the electrical connection between the sensor module and the electronics module.**

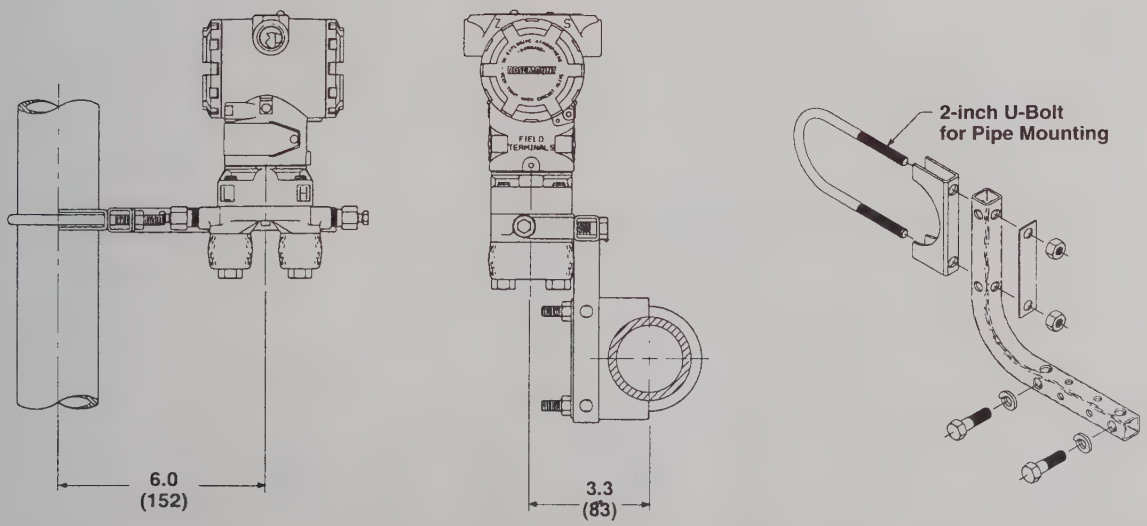
FIGURE 3-11. Coplanar Flange Mounting Configurations with Optional Bracket (B4) for 2-in. Pipe or Panel Mounting.

PANEL MOUNTING



PANEL MOUNTING CONFIGURATION
3/8–16 × ¼ Bolts (2) Supplied for Attaching Bracket to Transmitter

PIPE MOUNTING

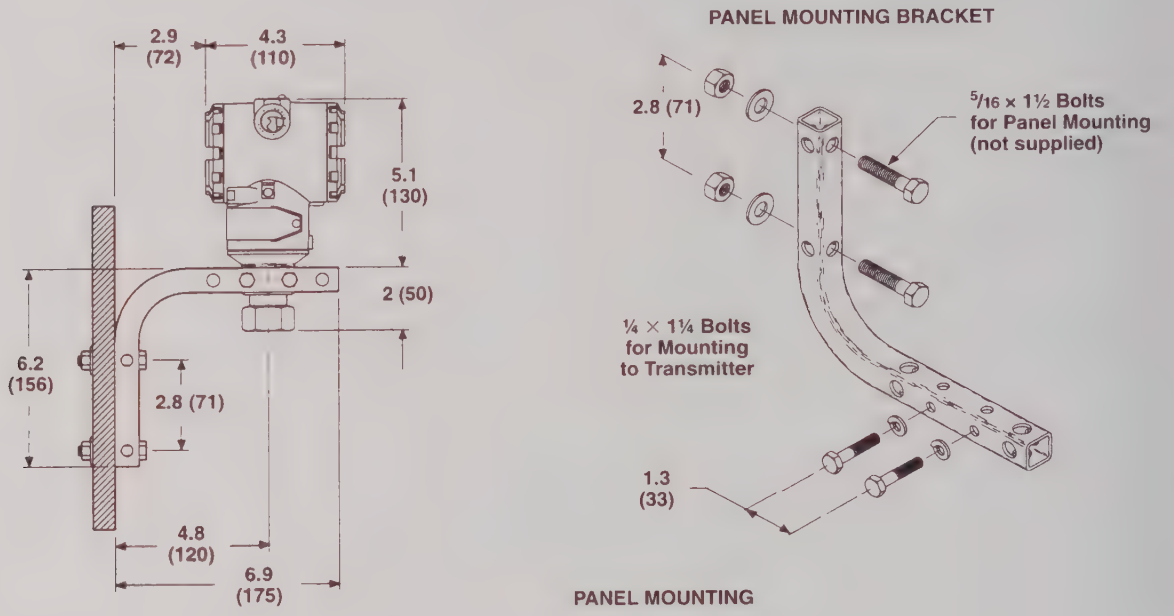


NOTE
Dimensions are in inches (millimeters).

3051-3051A04A, D04A

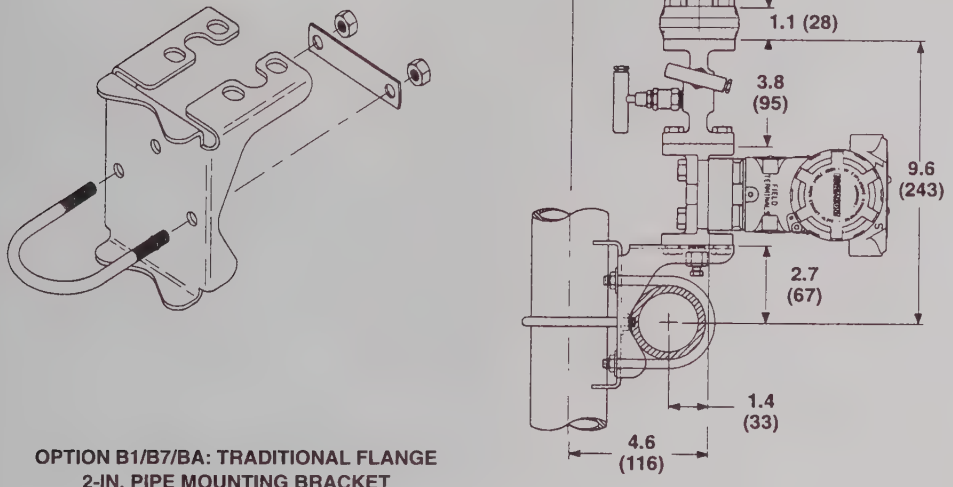
3051-3031M04A, L04A, J04A

FIGURE 3-12. Model 3051T Mounting Configurations with Optional Bracket (B4) for 2-in. Pipe or Panel Mounting.



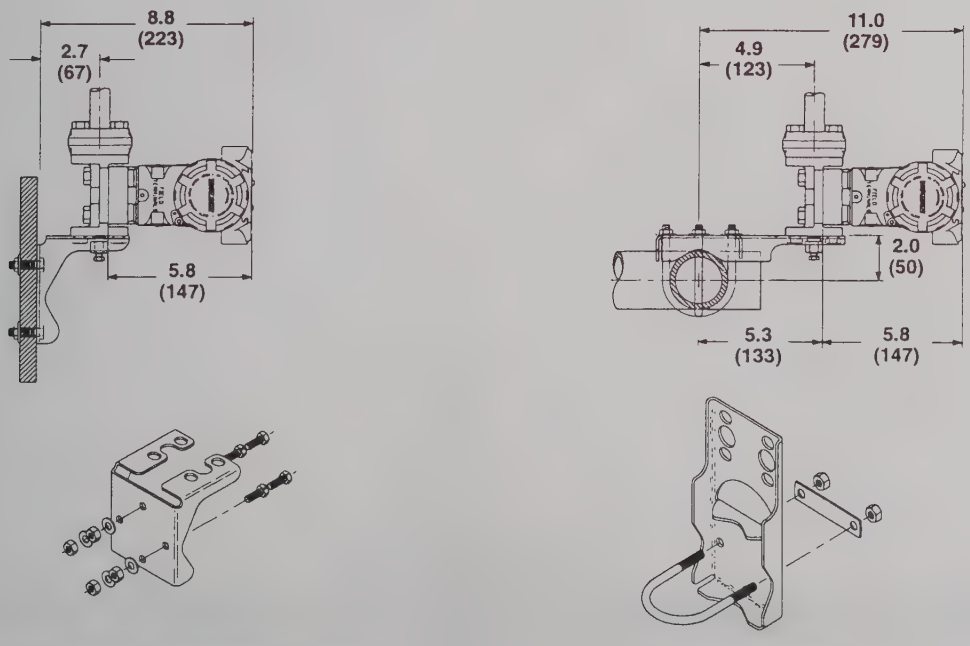
NOTE
Dimensions are in inches (millimeters).

FIGURE 3-13. Optional Mounting Bracket for Traditional Flange Options B1/B7/BA.



OPTION B1/B7/BA: TRADITIONAL FLANGE 2-IN. PIPE MOUNTING BRACKET

FIGURE 3-14. Optional Mounting Brackets for Traditional Flange Options B2/B8, B3/B9/BC.



OPTION B2/B8: TRADITIONAL FLANGE PANEL MOUNTING BRACKET

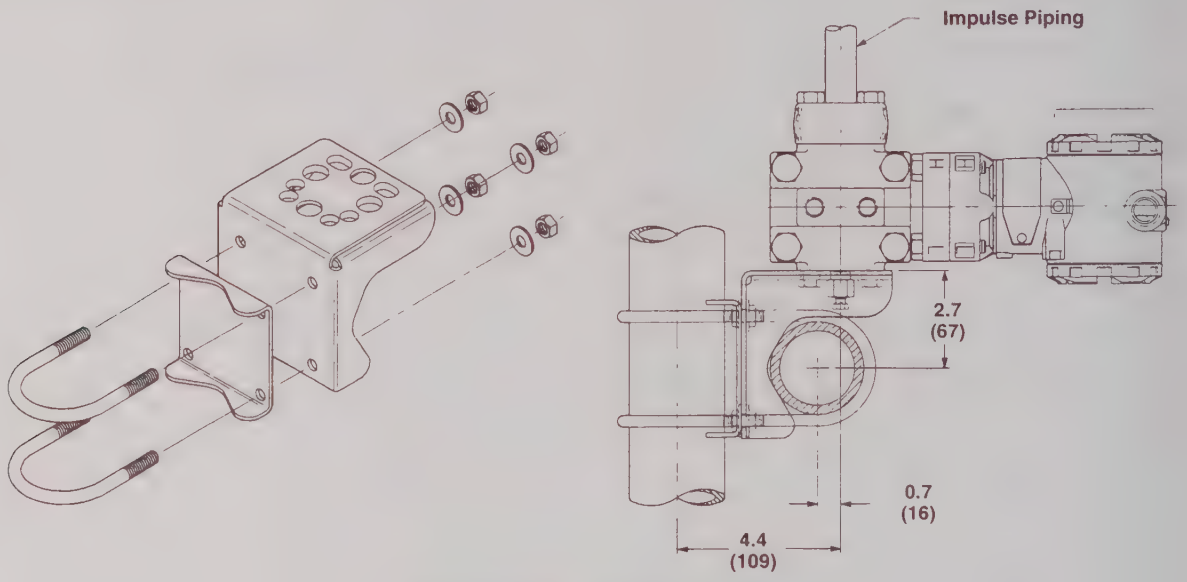
OPTION B3/B9/BC: TRADITIONAL FLANGE

NOTE
Dimensions are in inches (millimeters).

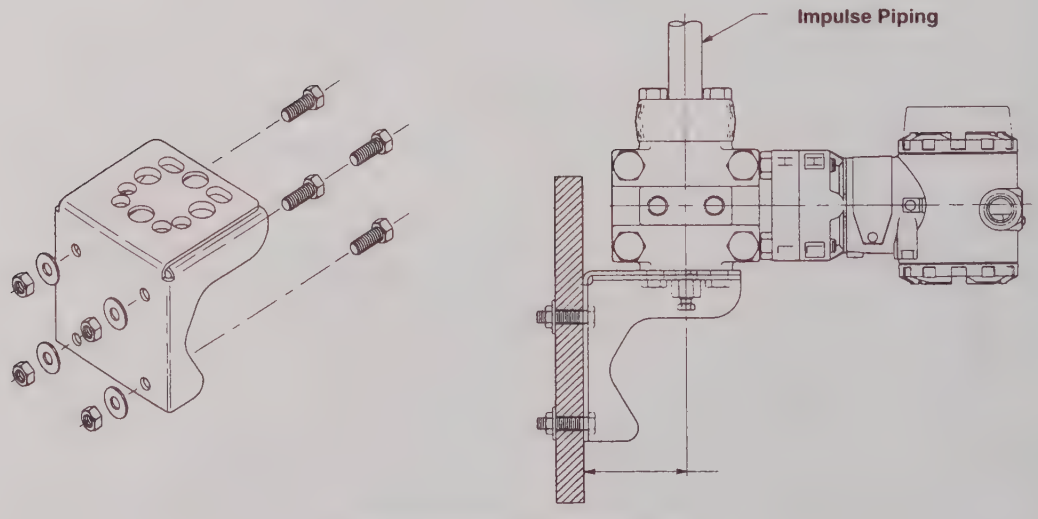
3051-3031C19A, I19C

3051-3031J19D, E19B\, J19E, H19A

FIGURE 3-15. Option B5/B6: Model 3051H Mounting Brackets for 2-in. Pipe and Panel Mount.



PIPE MOUNTING CONFIGURATION



PANEL MOUNTING CONFIGURATION
7/16–20×¾ Bolts Supplied for Attaching Bracket to Transmitter

NOTE
Dimensions are in inches (millimeters).

Mounting Bolts

The following guidelines have been established to ensure a tight flange, adapter, or manifold seal. The Model 3051 is shipped with the Coplanar flange installed with four 1.75-inch flange bolts. The following bolts also are supplied to facilitate other mounting configurations:

Differential Pressure

- Four 2.88-inch flange/adapter bolts for mounting the flange adapters to the Coplanar flange.
- Four 2.25-inch manifold/flange bolts for mounting the Coplanar flange on a three-valve manifold. In this configuration, the 1.75-inch bolts may be used to mount the flange adapters to the process connection side of the manifold.

Gage/Absolute Pressure

- Two 2.88-inch flange/adapter bolts for mounting the flange adapters to the Coplanar flange.

Figures 3-16 and 3-17 show mounting bolts and bolting configurations. See Page 6-9 for bolting requirements for alternate mounting configurations.

Stainless steel bolts supplied by Rosemount Inc. are coated with a lubricant to ease installation. Carbon steel bolts do not require lubrication. No additional lubricant should be applied when installing either type of bolt. Bolts supplied by Rosemount Inc. are identified by their head markings:

Carbon Steel Head Markings (CS)

Stainless Steel Head Markings (SST)

*The last digit in the F593_ head marking may be any letter between A and M.

Bolt Installation

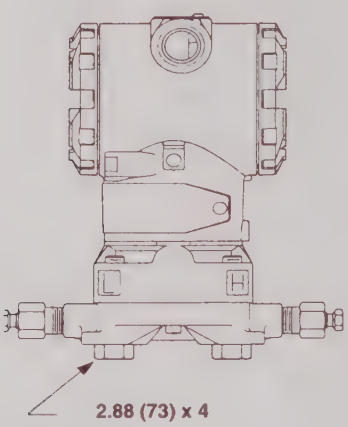
⚠ Only use bolts supplied with the Model 3051 or sold by Rosemount Inc. as spare parts for the Model 3051. Use the following bolt installation procedure:

1. Finger-tighten the bolts.
2. Torque the bolts to the initial torque value using a cross-pattern (see Table 3-2 for torque values).
3. Torque the bolts to the final torque value using the same cross-pattern.

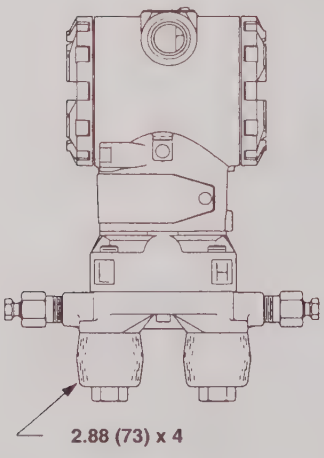
TABLE 3-2. Bolt Installation Torque Values.

Bolt Material	Initial Torque Value	Final Torque Value
Carbon Steel (CS)	300 in-lb (34 N-m)	650 in-lb (73 N-m)
Stainless Steel (SST)	150 in-lb (17 N-m)	300 in-lb (34 N-m)

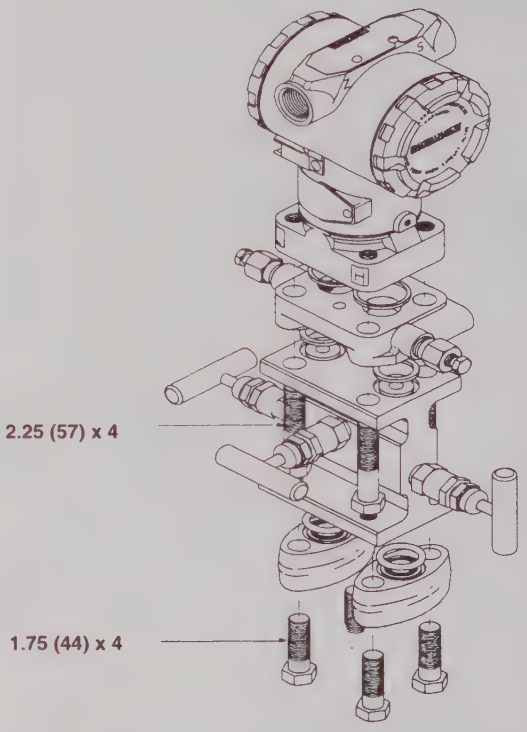
FIGURE 3-16. Mounting Bolts and Bolt Configurations for Coplanar Flange.



TRANSMITTER WITH
FLANGE BOLTS



TRANSMITTER WITH
FLANGE ADAPTERS
AND FLANGE/ADAPTER BOLTS



TRANSMITTER WITH 3-VALVE MANIFOLD
MANIFOLD/FLANGE BOLTS
FLANGE ADAPTERS
AND FLANGE/ADAPTER BOLTS
(Differential Configuration Shown)

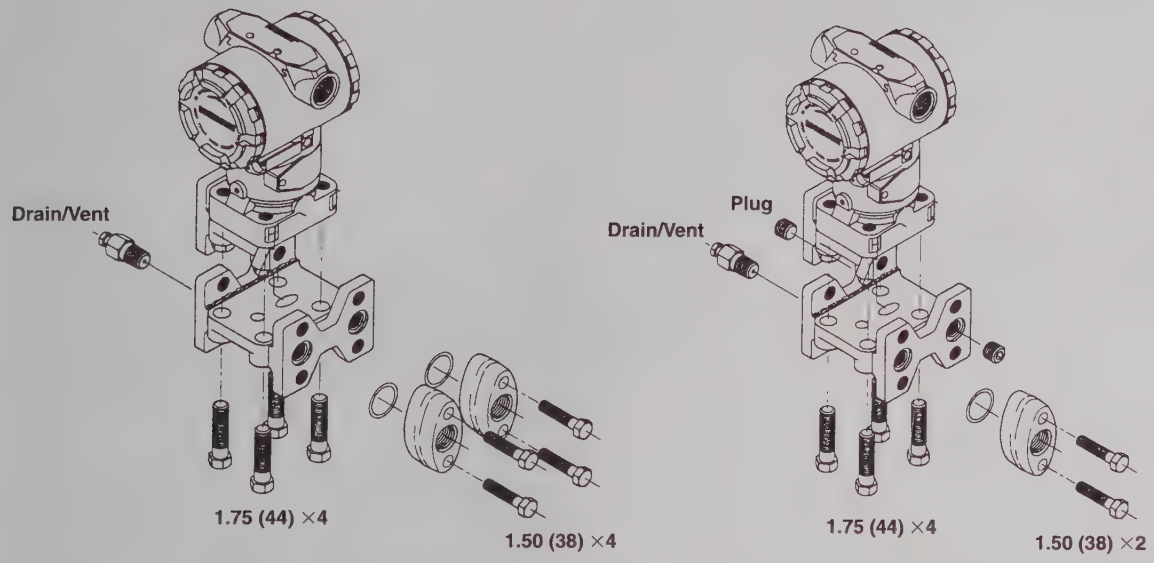
NOTE
Dimensions are in inches (millimeters).

DESCRIPTION	QTY	SIZE inch (mm)
Differential Pressure		
Flange bolts	4	1.75 (44)
Flange/adapter bolts	4	2.88 (73)
Manifold/flange bolts	4	2.25 (57)
Gage/Absolute Pressure*		
Flange bolts	4	1.75 (44)
Flange/adapter bolts	2	2.88 (73)

* *Model 3051T Transmitters are direct mount and do not require bolts for process connection*

3051-3051C06A 3051-3051A29A

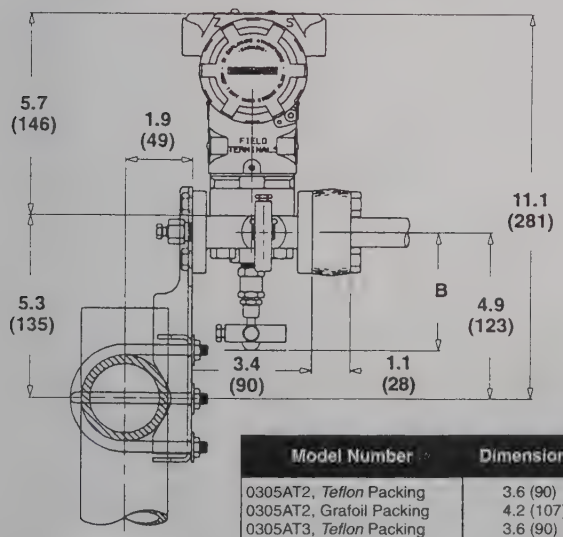
FIGURE 3-17. Traditional Flange Bolt Configurations.



NOTE
Dimensions are in inches (millimeters).

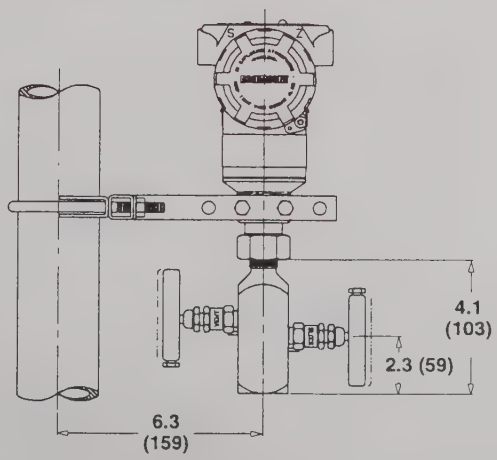
FIGURE 3-18. Typical Mounting Configurations for Model 3051 Transmitters with Models 305 and 306 Manifolds.

Model 3051C with Model 305 Manifold and Option Code B3/B9/BC Mounting Bracket



Model Number	Dimension B
0305AT2, *Teflon* Packing	3.6 (90)
0305AT2, Grafoil Packing	4.2 (107)
0305AT3, *Teflon* Packing	3.6 (90)
0305AT3, Grafoil Packing	4.2 (107)
0305AT7, (ANSI B31.1)	4.2 (107)
0305AT8, (ANSI B31.1)	4.2 (107)

Model 3051T with Model 306 Manifold and Option Code B4 Mounting Bracket



NOTE
Dimensions are in inches (millimeters).

ELECTRICAL CONSIDERATIONS

The transmitter terminal block is in the compartment of the electronics housing labelled "FIELD TERMINALS." The other compartment contains the transmitter electronics module. Connections for the HART-based communicator are attached beneath the terminal screws on the terminal block. You can connect the Rosemount Model 272 Field Calibrator at the signal terminals to provide power to the transmitter temporarily for calibration or diagnostic purposes. Or you can attach it to the test connections on the terminal block of the transmitter for indication purposes. Figure 3-19 shows power supply load limitations for the transmitter.

Power Supply

4–20mA Transmitters

The dc power supply should provide power with less than 2 percent ripple. The total resistance load is the sum of the resistance of the signal leads and the load resistance of the controller, indicator, and related pieces. Note that the resistance of intrinsic safety barriers, if used, must be included.

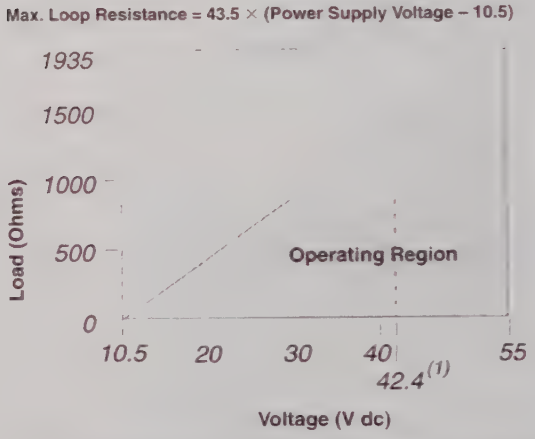
NOTE
A minimum loop resistance of 250 ohms is required to communicate with a HART-based communicator. With 250 ohms of loop resistance, the transmitter will require a minimum of 16 volts to output 20 mA.

If a single power supply is used to power more than one Model 3051 transmitter, the power supply used, and circuitry common to the transmitters, should not have more than 20 ohms of impedance at 1200 Hz.

Low-Power Transmitters

Low-power transmitters require a 6–12 V dc external power supply.

FIGURE 3-19. Power Supply Load Limitations, 4–20 mA Transmitters.



Communication requires a minimum loop resistance of 250 ohms.

(1) For CSA approval, power supply must not exceed 42.4 V.

Wiring

⚠ To make connections, remove the housing cover on the side marked FIELD TERMINALS. Do not remove the instrument covers in explosive atmospheres when the circuit is alive. All power to the transmitter is supplied over the signal wiring. Connect the lead that originates at the positive side of the power supply to the terminal marked "+" and the lead that originates at the negative side of the power supply to the terminal marked "–". Avoid contact with the leads and the terminals. Do not connect the powered signal wiring to the test terminals. Power could damage the test diode in the test connection.

Plug and seal unused conduit connections on the transmitter housing to avoid moisture accumulation in the terminal side of the housing. If you do not seal the unused connections, mount the transmitter with the electrical housing positioned downward for drainage. Install wiring with a drip loop. Arrange the drip loop so the bottom is lower than the conduit connections and the transmitter housing.

NOTE
Signal wiring need not be shielded, but use twisted pairs for best results. In order to ensure proper communication, use 24 AWG or larger wire, and do not exceed 5,000 feet (1500 meters).

Inductive-based transient protectors, including the Rosemount Model 470, can adversely affect the output of Model 3051 4–20 mA transmitters. Do not use the Model 470 for transient protection with the Model 3051. If your application requires transient protection, install the Transient Protection Terminal Block (see "Transient Protection Terminal Block (T1)" on Page 6-10).

Signal Wiring Grounding

Do not run signal wiring in conduit or open trays with power wiring, or near heavy electrical equipment. You may ground the signal wiring at any one point on the signal loop, or leave it ungrounded. The negative terminal of the power supply is a recommended grounding point.

Grounding the Transmitter Case

The transmitter case should always be grounded in accordance with national and local electrical codes. The most effective transmitter case grounding method is direct connection to earth ground with minimal impedance. Methods for grounding the transmitter case include:

- **Internal Ground Connection**: The Internal Ground Connection screw is inside the FIELD TERMINALS side of the electronics housing. This screw is identified by a ground symbol (⏚), and is standard on all Model 3051 transmitters.
- **External Ground Assembly**: This assembly is included with the optional transient protection terminal block (Option Code T1), and it is included with CESI/CENELEC Flameproof Certification (Option Code E8), BASEEFA/CENELEC Intrinsic Safety Certification (Option Code I1), and BASEEFA Type N Certification (Option Code N1). The External Ground Assembly can also be ordered with the transmitter (Option Code V5), or as a spare part (03031-0398-0001).

NOTE
Grounding the transmitter case using the threaded conduit connection may not provide a sufficient ground.

The transient protection terminal block (Option Code T1) does not provide transient protection unless the transmitter case is properly grounded. Use the above guidelines to ground the transmitter case. Do not run the transient protection ground wire with signal wiring as the ground wire may carry excessive current if a lighting strike occurs.

ENVIRONMENTAL CONSIDERATIONS

Mount the transmitter to minimize ambient temperature changes. Section–5 Specifications and Reference Data lists the transmitter temperature operating limits. Mount the transmitter to avoid vibration and mechanical shock, and to avoid external contact with corrosive materials.

Access Requirements

When choosing an installation location and position, take into account the need for access to the transmitter:

Process Flange Orientation

Mount the process flanges with sufficient clearance for process connections. For safety reasons, place the drain/vent valves so the process fluid is directed away from technicians when the vents are used. In addition, consider the possible need for a testing or calibration input.

Housing Rotation

See "Housing Rotation" on Page 3-12.

Terminal Side of Electronics Housing

Mount the transmitter so that the terminal side is accessible. A 0.75-inch clearance is required for cover removal. Use a conduit plug on the unused side of the conduit opening.

Circuit Side of Electronics Housing

Provide 0.75 inches clearance if possible for cover removal. Three inches of clearance is required for cover removal if a meter is installed.

Exterior of Electronics Housing

The integral span and zero adjustments are located under the certifications plate on the top of the transmitter. Allow 1.0 inch of clearance above the transmitter if you intend to use the integral zero and span adjustments.

Cover Installation

Always install the electronics housing covers metal-to-metal to ensure a proper seal.

Section 4

Troubleshooting

OVERVIEW

Table 4-1 provides summarized troubleshooting suggestions for the most common operating problems.

If you suspect a malfunction despite the absence of any diagnostic messages on the communicator display, follow the procedures described here to verify that transmitter hardware and process connections are in good working order. Always deal with the most likely and easiest-to-check conditions first.

SAFETY MESSAGES

Procedures and instructions in this section may require special precautions to ensure the safety of the personnel performing the operations. Information that raises potential safety issues is indicated by a warning symbol (⚠). Refer to the following safety messages before performing an operation preceded by this symbol.

Warnings (⚠)

⚠WARNING

Explosions can result in death or serious injury.

- Do not remove the transmitter covers in explosive environments when the circuit is alive.
- Both transmitter covers must be fully engaged to meet explosion-proof requirements.
- Before connecting a communicator in an explosive atmosphere, make sure the instruments in the loop are installed in accordance with intrinsically safe or nonincendive field wiring practices.

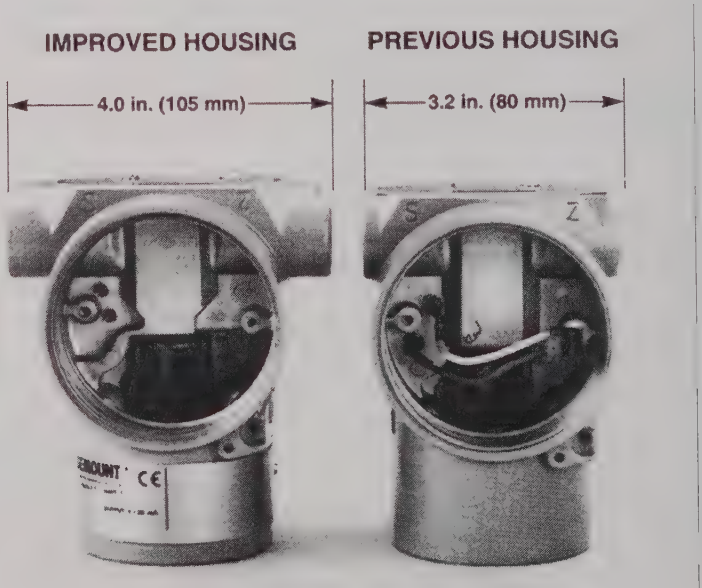
TABLE 4-1. Model 3051 Troubleshooting Chart.

Symptom	Corrective Actions
Milliamp Reading is Zero	• Check if Power Polarity is Reversed • Verify Voltage Across Terminals (should be 10 to 55 V dc) • Check for Bad Diode in Terminal Block • Replace Transmitter Terminal Block
Transmitter not Communicating with Communicator	• Check Power Supply Voltage at Transmitter (Minimum 10.5 V) • Check Load Resistance (250 Ω minimum) • Check if Unit is Addressed Properly • Replace Electronics Board
Milliamp Reading is Low or High	• Check Pressure Variable Reading for Saturation • Check if Output is in Alarm Condition • Perform 4–20 mA Output Trim • Replace Electronics Board
No Response to Changes in Applied Pressure	• Check Test Equipment • Check Impulse Piping for Blockage • Check for Disabled Span Adjustment • Check Transmitter Security Jumper • Verify Calibration Settings (4 and 20 mA Points) • Replace Sensor Module
Pressure Variable Reading is Low or High	• Check Impulse Piping for Blockage • Check Test Equipment • Perform Full Sensor Trim • Replace Sensor Module
Pressure Variable Reading is Erratic	• Check Impulse Piping for Blockage • Check Damping • Check for EMF Interference • Replace Sensor Module

BEFORE YOU DISASSEMBLE THE TRANSMITTER

Maintenance procedures differ for improved and previous style transmitter housings. Verify the specific physical characteristics of your transmitter before you begin any maintenance procedures. The width of the conduit entries is the most noticeable physical difference between the improved and the previous style housing (see Figure 4-1).

FIGURE 4-1. Improved and Previous Styles of the Model 3051 Transmitter Housing.

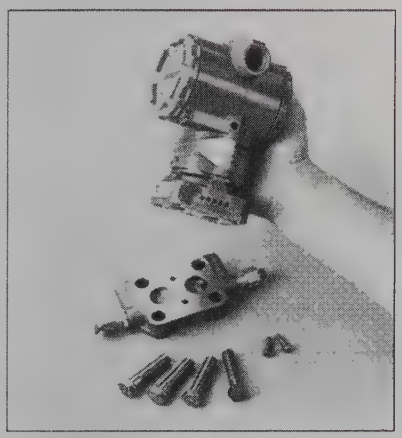


DISASSEMBLY PROCEDURES

⚠ Do not remove the instrument cover in explosive atmospheres when the circuit is alive.

Remove Transmitter from Service

NOTE
Once you have determined a transmitter to be inoperable, remove it from service.


3051-052AB

Be aware of the following:

- Isolate and vent the process from the transmitter before removing the transmitter from service.
- Remove all electrical leads and conduit.
- Detach the process flange by removing the four flange bolts and the two alignment screws that secure it.
- Do not scratch, puncture, or depress the isolating diaphragms.
- Clean isolating diaphragms with a soft rag and a mild cleaning solution, and rinse with clear water.
- Whenever you remove the process flange or flange adapters, visually inspect the Teflon O-rings. Replace the O-rings if they show any signs of damage, such as nicks or cuts. If they are undamaged, you may reuse them.

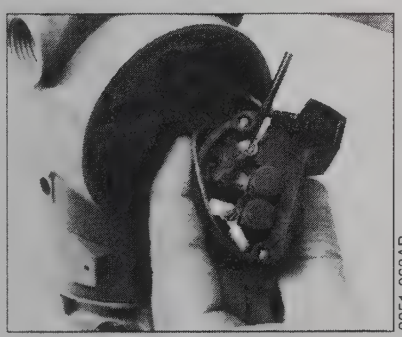
The Model 3051C transmitter is attached to the process connection by four bolts and two cap screws. Remove the four bolts and separate the transmitter from the process connection manifold or flange. You can leave the process connection in place and ready for re-installation.

The Model 3051T is attached to the process by a single hex nut process connection. Loosen the hex nut to separate the transmitter from the process.

Remove the Terminal Block

Electrical connections are located on the terminal block in the compartment labelled "FIELD TERMINALS."

Loosen the two small screws located at the 9 o'clock and 4 o'clock positions, and pull the entire terminal block out to remove it.

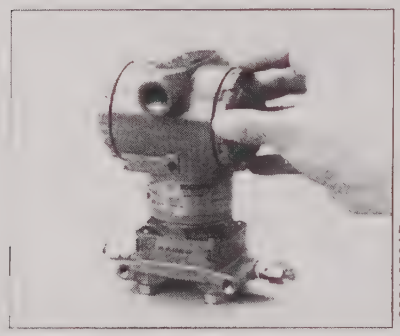

3051-068AB

NOTE
If removing the terminal block from the housing of a previous version of the transmitter, you will have to manually disconnect the power leads from the rear of the terminal block before completely separating it from the housing.

Remove the Electronics Board

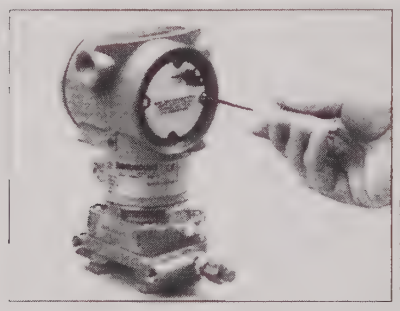
The transmitter electronics board is located in the compartment opposite the terminal side. To remove the electronics board perform the following procedure:

1. Remove the housing cover opposite the field terminal side.



3051-053AB

2. Loosen the two captive screws that anchor the board to the housing. The electronics board is electrostatically sensitive; observe handling precautions for static-sensitive components.

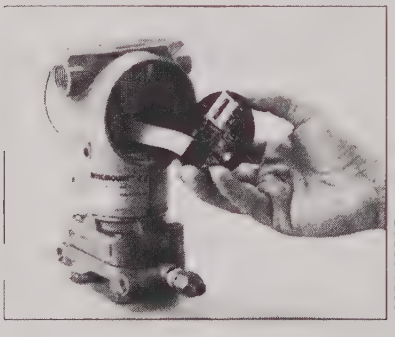


3051-054AB

NOTE

If you are disassembling a transmitter with a LCD meter, loosen the two captive screws that are visible on the right and left sides of the meter display. The two screws anchor the LCD meter to the electronics board and the electronics board to the housing.

3. Slowly pull the electronics board out of the housing. With the two captive screws free of the transmitter housing, only the sensor module ribbon cable holds the board to the housing.

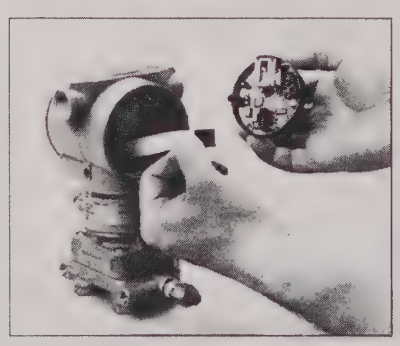


3051-055AB

NOTE

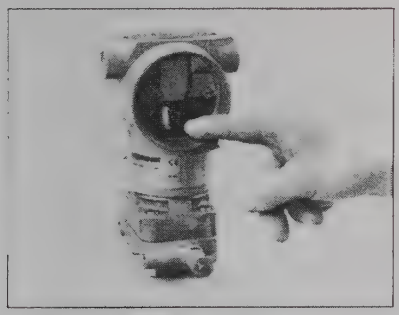
Previous versions of the electronics board utilize a snap-in power plug and receptacle. Carefully unsnap the power plug from the receptacle to free the board from the power cord.

4. Disconnect the sensor module ribbon cable to release the electronics board from the transmitter.



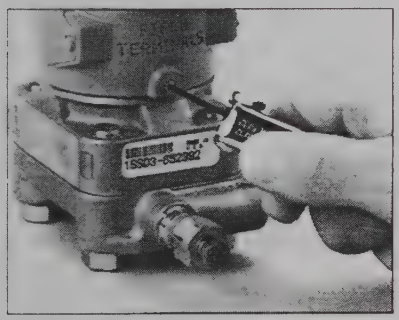
3051-056AB

Remove the Sensor Module from the Electronics Housing


3051-057AB

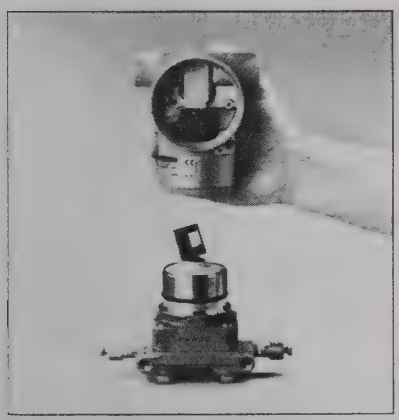
1. Carefully tuck the cable connector completely inside of the internal shroud.

IMPORTANT
Do not remove the housing until after you tuck the cable connector completely inside of the internal shroud. The shroud protects the cable from damage that can occur when you rotate the housing.


3051-059AB

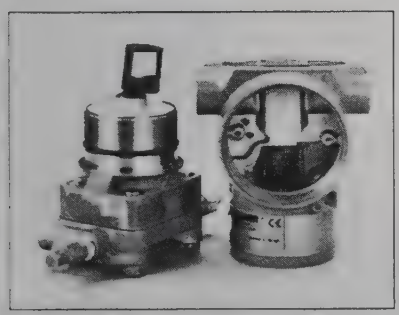
2. Loosen the housing rotation set screw with a 9/64-inch hex wrench, and back off one full turn.

IMPORTANT
To prevent damage to the sensor module ribbon cable, disconnect it from the electronics board before you remove the sensor module from the electrical housing.


3051-060AB

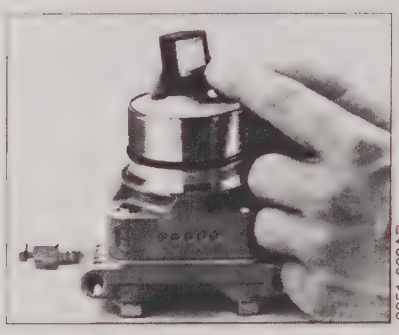
3. Unscrew the housing from the module, making sure the shroud and sensor cable do not catch on the housing.

IMPORTANT
Make sure the sensor ribbon cable and internal shroud remain completely free of the housing as you rotate it. Damage can occur to the cable if the internal shroud and sensor cable become hung up and rotate with the housing.


3051-061AB

REASSEMBLY PROCEDURES

Attach the Sensor Module to the Electronics Housing

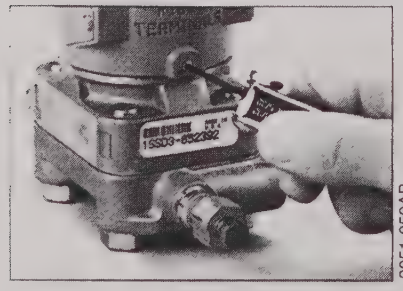

3051-062AB

3051-060AB

1. Inspect all cover and housing (non-process-wetted) O-rings and replace if necessary. Lightly grease with silicone lubricant to ensure a good seal.
2. Carefully tuck the cable connector completely inside the internal shroud. To do so, turn the shroud and cable counterclockwise one rotation to tighten the cable.
3. Lower the electronics housing onto the module, and guide the internal shroud and cable through the housing and into the external shroud.
4. Turn the housing clockwise to fasten it to the module.

IMPORTANT

To prevent damage to the cable connector, watch the cable and shroud as you attach the housing to the module. Make sure the cable connector does not slip out of the internal shroud and begin to rotate with the housing. Reinsert the cable connector into the shroud if it escapes before the housing is fully fastened.


3051-059AB

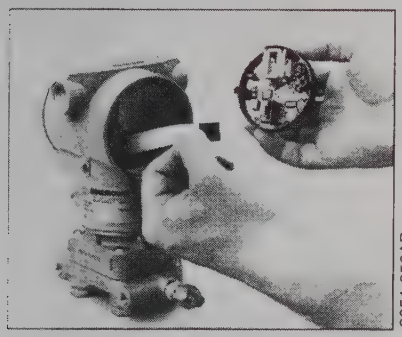
⚠ 5. Thread the housing completely onto the sensor module. To comply with explosion-proof requirements, the housing must be no more than one full turn from flush with the sensor module.
6. Tighten the housing rotation set screw using a 9/64-inch hex wrench.

NOTE

Electronics board revision 5.3.163 or later (all shrouded designs) have increased functionality that allows verification testing of alarm current levels. If you repair or replace the transmitter electronics board, sensor module or LCD meter, it is recommended that you verify the transmitter alarm level before you return the transmitter to service (see "Alarm Level Verification" on page 2-4).

⚠ See "Safety Messages" on page 4-1 for complete warning information.

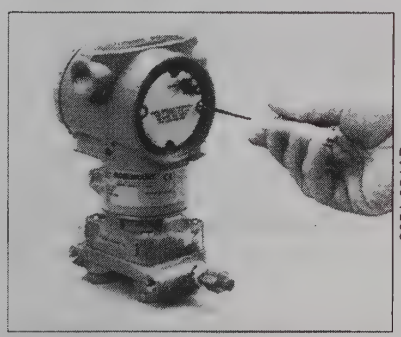
Attach the Electronics Board



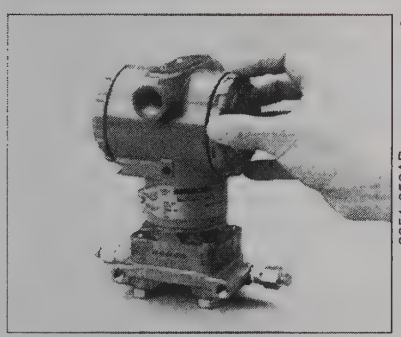
1. Remove the cable connector from its position inside of the internal shroud, and attach it to the electronics board.

2. Insert the electronics board into the housing, making sure that the posts from the electronics housing properly engage the receptacles on the electronics board.

NOTE
If you are reassembling a previous version of the electronics board, or if you are placing a new version of the electronics board in a previous version of the housing, attach the snap-in power connection to the receptacle on the board with the black and red wires routed towards the center of the board and below the white reed switch holder.



3. Tighten the captive mounting screws.



4. Replace the electronics housing cover. The transmitter covers must be engaged metal-to-metal to ensure proper seal and to meet explosion-proof requirements.

NOTE
Electronics board revision 5.3.163 or later (all shrouded designs) have increased functionality that allows verification testing of alarm current levels. If you repair or replace the transmitter electronics board, sensor module or LCD meter, it is recommended that you verify the transmitter alarm level before you return the transmitter to service (see "Alarm Level Verification" on page 2-4).

Install the Terminal Block

⚠ Gently slide the terminal block into place, making sure the posts from the electronics housing properly engage the receptacles on the terminal block. Tighten the captive screws, and replace the electronics housing cover. The transmitter covers must be fully engaged to meet explosion-proof requirements.

3051-068AB

NOTE

If you are reassembling a previous version of the terminal block, attach the black and red wires to the back side of the block before you insert it into the electronics housing.

Reassemble the Process Sensor Body

1. Visually inspect the Teflon sensor module O-rings. If the O-rings are undamaged, you may reuse them. If the O-rings show signs of damage, such as nicks or cuts, or if there is any doubt about their ability to seal properly, replace them with new O-rings.

IMPORTANT

If replacing the O-rings, take care not to scratch or deface the O-ring grooves or the surface of the isolating diaphragm while you remove the damaged O-rings.

2. Install the process flange on the sensor module. To hold the process flange in place, install the two hex head alignment screws. These screws are not pressure retaining and need only be finger tight. Do not overtighten; this will affect the module/flange alignment.
3. Install the appropriate flange bolts:

- For installations requiring a ¼–18 NPT mounting, install the four 1.75-inch process flange bolts. First finger-tighten, then tighten the bolts incrementally in a cross pattern until they are tightened to the appropriate torque values. See "Bolt Installation" on page 3-17 for complete bolt installation information and torque values. When fully tightened, the bolts should extend through the top of the module housing.
- For installations requiring a ½–14 NPT mounting, hold the flange adapters and flange adapter O-rings in place while finger-tightening the four 2.88-inch process flange/adapter bolts (use two 2.88-inch bolts and two 1.75-inch bolts for gage pressure configurations). Tighten the bolts incrementally in a cross pattern until they are tightened to the appropriate torque values. See "Bolt Installation" on page 3-17 for complete bolt installation information and torque values. When fully tightened, the bolts should extend through the top of the module housing.

⚠ See "Safety Messages" on page 4-1 for complete warning information.

- For installations with a three-valve manifold (differential pressure applications only), align the process flange with the three-valve manifold, and finger-tighten the four 2.25-inch manifold flange bolts following the procedure outlined above. Tighten the bolts incrementally in a cross pattern until they are tightened to the appropriate torque values. See "Bolt Installation" on page 3-17 for complete bolt installation information and torque values. When fully tightened, the bolts should extend through the top of the module housing. Install flange adapters on the process end of the three-valve manifold using the 1.75-inch flange bolts supplied with the transmitter.

4. If you replaced the Teflon sensor module O-rings, re-torque the flange bolts after installation to compensate for cold flow.
5. Install the drain/vent valve:
   a. Apply sealing tape to the threads on the seat. Starting at the base of the valve with the threaded end pointing toward the installer, apply two clockwise turns of the sealing tape.
   b. Take care to place the opening on the valve so that process fluid will drain toward the ground and away from personnel when the valve is opened.
   c. Tighten the drain/vent valve to 250 in-lb (28.25 N-m).

NOTE
After replacing O-rings on Range 1 transmitters and re-installing the process flange, expose the transmitter to a temperature of 185 °F (85 °C) for two hours. Then re-tighten the flange bolts in a cross pattern, and again expose the transmitter to a temperature of 185 °F (85 °C) for two hours before calibration.

Returning Rosemount Products and/or Materials

To expedite the return process outside of the United States, contact the nearest Rosemount representative.

Within the United States, call the Rosemount National Response Center using the 1-800-654-RSMT (7768) toll-free number. This center, available 24 hours a day, will assist you with any needed information or materials.

The center will ask for product model and serial numbers, and will provide a Return Material Authorization (RMA) number. The center will also ask for the process material to which the product was last exposed.

⚠CAUTION

Individuals who handle products exposed to a hazardous substance can avoid injury if they are informed of and understand the hazard. If the product being returned was exposed to a hazardous substance as defined by OSHA, a copy of the required Material Safety Data Sheet (MSDS) for each hazardous substance identified must be included with the returned goods.

Rosemount National Response Center representatives will explain the additional information and procedures necessary to return goods exposed to hazardous substances.

Section 5 Specifications and Reference Data

FUNCTIONAL SPECIFICATIONS

Service

Liquid, gas, and vapor applications.

Range and Sensor Limits

TABLE 5-1. Model 3051CD, 3051CG, 3051P, 3051L, and 3015H Range and Sensor Limits.

Range	Minimum Span		Range and Sensor Limits						
				Lower (LRL)					
	Model 3051 CD, CG, L, H	Model 3051P	Upper (URL)	3051C/P Differential	3051C/P Gage	3051L Differential	3051L Gage	3051H Differential	3051H Gage
1	0.5 inH_2O (0.12 kPa)	NA	25 inH_2O (6.22 kPa)	–25 inH_2O (1) (–6.22 kPa)	NA	NA	NA	NA	NA
2	2.5 inH_2O (0.62 kPa)	25 inH_2O (6.22 kPa)	250 inH_2O (62.2 kPa)	–250 inH_2O (–62.2 kPa)	–250 inH_2O (–62.2 kPa)	–250 inH_2O (–62.2 kPa)	–250 inH_2O (–62.2 kPa)	–250 inH_2O (–62.2 kPa)	–250 inH_2O (–62.2 kPa)
3	10 inH_2O (2.48 kPa)	100 inH_2O (24.8 kPa)	1,000 inH_2O (248 kPa)	–1,000 inH_2O (–248 kPa)	0.5 psia (3.5 kPa abs)	–1,000 inH_2O (–248 kPa)	0.5 psia (3.5 kPa abs)	–1,000 inH_2O (–248 kPa)	0.5 psia (3.5 kPa abs)
4	3 psi (20.7 kPa)	30 psi (207 kPa)	300 psi (2070 kPa)	–300 psi (1) (–2070 kPa)	0.5 psia (3.5 kPa abs)	–300 psi (–2070 kPa)	0.5psia (3.5 kPa abs)	–300 psi (–2070 kPa)	0.5psia (3.5 kPa abs)
5	20 psi (138 kPa)	200 psi (1380 kPa)	2,000 psi (13800 kPa)	– 2,000 psi (1) (–13800 kPa)	0.5 psia (3.5 kPa abs)	NA	NA	– 2,000 psi (–13800 kPa)	0.5psia (3.5 kPa abs)

(1) This range not available for Model 3051P Reference Class Transmitters.

TABLE 5-2. Model 3051CA Range and Sensor Limits.

Range	Minimum Span	Range and Sensor Limits	
		Upper (URL)	Lower (LRL)
0	0.167 psia (8.6 mmHga)	5 psia (260 mmHga)	0 psia (0 mmHga)
1	0.3 psia (2.07 kPa)	30 psia (206.8 kPa)	0 psia (0 kPa)
2	1.5 psia (10.34 kPa)	150 psia (1034.2 kPa)	0 psia (0 kPa)
3	8 psia (55.16 kPa)	800 psia (5515.8 kPa)	0 psia (0 kPa)
4	40 psia (275.8 kPa)	4,000 psia (27580 kPa)	0 psia (0 kPa)

TABLE 5-3. Model 3051T Gage and Absolute Range and Sensor Limits[1].

Range	Minimum Span	Range and Sensor Limits	
		Upper (URL)	Lower (LRL)
1	0.3 psi (2 kPa)	30 psi (207 kPa)	0 psi (0 kPa)
2	1.5 psi (10 kPa)	150 psi 1034 kPa)	0 psi (0 kPa)
3	8 psi (55 kPa)	800 psi (5516 kPa)	0 psi (0 kPa)
4	40 psi (276 kPa)	4,000 psi (27579 kPa)	0 psi (0 kPa)
5	2,000 psi (13800 kPa)	10,000 psi (68948 kPa)	0 psia (0 kPa)

(1) For absolute limits, substitute psia for units.

Zero and Span Adjustment Requirements

- Zero and span values can be set anywhere within the range limits stated in Tables 5-1 – 5-3.
- Span must be greater than or equal to the minimum span stated in Tables 5-1 – 5-3.

Service

Liquid, gas, and vapor applications.

4–20 mA (Output Code A)

Output

Two-wire 4–20 mA, user-selectable for linear or square root output. Digital process variable superimposed on 4–20 mA signal, available to any host that conforms to the HART protocol.

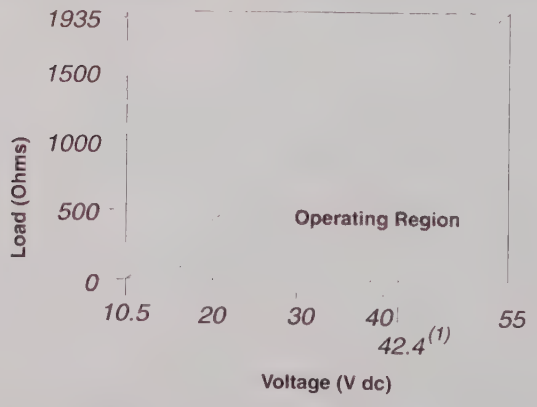
Power Supply

External power supply required. Standard transmitter (4–20 mA) operates on 10.5–55 V dc with no load.

Load Limitations

Maximum loop resistance is determined by the voltage level of the external power supply, as described by:

Max. Loop Resistance = 43.5 × (Power Supply Voltage – 10.5)



3051-0103A

Communication requires a minimum loop resistance of 250 ohms.

(1) For CSA approval, power supply must not exceed 42.4 V.

Low-Power (Output Code M)

Output

Three wire 1–5 V dc or 0.8–3.2 V dc (Option Code C2) user-selectable output. Also user selectable for linear or square root output configuration. Digital process variable superimposed on voltage signal, available to any host conforming to the HART protocol. Low-power transmitter operates on 6–12 V dc with no load.

Power Consumption

3.0 mA, 18–36 mW.

Minimum Load Impedance

100 kΩ (V_{out} wiring).

Indication

Optional 2-line, 5-digit LCD meter.

Hazardous Locations Certifications

See Page 5-13.

Overpressure Limits

Transmitters withstand the following limits without damage:

Model 3051CD/CG

Range 1: 0 psia–2,000 psig (0–13.8 MPa).
Ranges 2–5: 0 psia–3,626 psig (0–25 MPa).

Model 3051CA

Range 0: 0–60 psia (0–413.7 kPa).
Range 1: 0–120 psia (0–827.4 kPa).
Range 2: 0–300 psia (0–2070 kPa).
Range 3: 0–1,600 psia (0–11030 kPa).
Range 4: 0–6,000 psia (0–41370 kPa).

Model 3051H

All Ranges: 0 psia–3,626 psig (0–25 MPa).

Model 3051TG/TA

Range 1: 0 psia–750 psi (0–5.2 MPa).
Range 2: 0 psia–1,500 psi (0–10.3 MPa)
Range 3: 0 psia–1,600 psi (0–11.0 MPa).
Range 4: 0 psia–6,000 psi (0–41.4 MPa).
Range 5: 0 psia–15,000 psi (0–103.4 MPa).

For Model 3051L or Level Flange Option Codes F1, F2, G1, G2, FA, FB, FC, and FD, limit is 0 psia to the flange rating or sensor rating, whichever is lower.

TABLE 5-4. Model 3051L and Level Flange Rating Limits.

Standard	Class	Carbon Steel Rating	Stainless Steel Rating
ANSI	150	285 psig(1)	275 psig(1)
ANSI	300	740 psig(1)	720 psig(1)
ANSI	600	1,480 psig(1)	1,440 psig(1)
DIN	PN 10–40	40 bar(2)	40 bar(2)
DIN	PN 10/16	16 bar(2)	16 bar(2)
DIN	PN 25/40	40 bar(2)	40 bar(2)

(1) At 100 °F (38 °C), the rating decreases with increasing temperature.

(2) At 120 °C, the rating decreases with increasing temperature.

Static Pressure Limit

Model 3051CD/PD Only

Operates within specifications between static line pressures of 0.5 psia and 3,626 psig (4,500 psig for Option Code P9); 2,000 psig for Range 1 (Ranges 2 and 3 for Model 3051P).

For Model 3051L or Level Flange Option Codes F1, F2, G1, G2, FA, FB, FC, and FD, limit is 0.5 psia to the flange rating or sensor rating, whichever is lower.

Burst Pressure Limits

Burst pressure on Coplanar, traditional, or Model 3051H process flange is 10,000 psig (69 MPa).

Burst pressure for the Model 3051T is
Ranges 1-4: 11,000 psi (0–75.8 MPa)
Range 5: 26,000 psig (179 MPa).

Failure Mode Alarm

Output Code A

If self-diagnostics detect a gross transmitter failure, the analog signal will be driven above or below a pre-selected alarm level outside of the 4–20 mA operating range. The standard alarm limits are below 3.75 mA for low, and above 21.75 mA for high. Also, NAMUR-Compliant alarm limits are available through the C4 option. NAMUR-Compliant limits are below 3.6 mA for low alarm, and above 22.5 mA for high alarm. High or low alarm signal is user-selectable by a jumper.

Output Code M

If self-diagnostics detect a gross transmitter failure, the analog signal will be driven either below 0.95 V or above 5.4 V to alert the user. (Below 0.75 V or above 4.2 V for option C2.) High or low alarm signal is user-selectable by internal jumper.

Temperature Limits

Ambient

–40 to 185 °F (–40 to 85 °C).

With integral meter: –4 to 175 °F (–20 to 80 °C).

Storage

–50 to 230 °F (–46 to 110 °C).

With integral meter: –40 to 185 °F (–40 to 85 °C).

Temperature Limits *(continued)*

Process *At atmospheric pressures and above.*

TABLE 5-5. Model 3051 Temperature Limits.

Models 3051CD, 3051CG, 3051CA	
Silicone Fill Sensor[1]	
with Coplanar Flange	–40 to 250 °F (–40 to 121 °C) [2]
with Traditional Flange	–40 to 300 °F (–40 to 149 °C) [2]
with Level Flange	
Horizontal Mount	–40 to 250 ° F (– 40 to 121 °C)[2]
Vertical Mount	–40 to 300 °F (–40 to 149 °C) [2]
with Model 305 Integral Manifold	–40 to 300 °F (–40 to 149 °C) [2]
Inert Fill Sensor [1]	0 to 185 °F (–18 to 85 °C) [3] [4]
Model 3051H (Process Fill Fluid)	
D.C.® Silicone 200 [1]	–40 to 375 °F (–40 to191 °C)
Inert [1]	–50 to 350 °F (–45 to 177 °C)
Neobee M-20® [1]	0 to 375 °F (–18 to 191 °C)
Model 3051T (Process Fill Fluid)	
Silicone Fill Sensor [1]	–40 to 250°F (–40 to 121°C) [2]
Inert Fill Sensor [1]	–22 to 250°F (–30 to 121°C) [2]
Model 3051L Low-Side Temperature Limits	
Silicone Fill Sensor [1]	–40 to 250 °F (–40 to 121 °C) [2]
Inert Fill Sensor [1]	0 to 185 °F (–18 to 85 °C) [2]
Model 3051L High-Side Temperature Limits (Process Fill Fluid)	
Syltherm® XLT	–100 to 300 °F (–73 to 149 °C)
D.C. Silicone 704[5]	60 to 600 °F (15 to 315 °C)
D.C. Silicone 200	–40 to 400 °F (–40 to 205 °C)
Inert	–50 to 350 °F (–45 to 177 °C)
Glycerin and Water[6]	0 to 200 °F (–18 to 93 °C)
Neobee M-20	0 to 400 °F (–18 to 205 °C)
Propylene Glycol and Water[6]	0 to 200 °F (–18 to 93 °C)
Syltherm 800	–50 to 400 °F (–45 to 205 °C)

(1) Process temperatures above 185 °F (85 °C) require derating the ambient limits by a 1.5:1 ratio (0.6:1 ratio for Model 3051H).

(2) 220 °F (104 °C) limit in vacuum service; 130 °F (54 °C) for pressures below 0.5 psia.

(3) 160 °F (71 °C) limit in vacuum service.

(4) Not available for Model 3051CA.

(5) Upper limit is for seal assemblies mounted away from the transmitter using capillaries.

(6) Not suitable for vacuum service.

Humidity Limits

0–100% relative humidity.

Turn-on Time

Performance within specifications less than 2.0 seconds after power is applied to transmitter.

Volumetric Displacement

Less than 0.005 in^3 (0.08 cm^3).

Damping

Analog output response to a step input change is user-selectable from 0 to 36 seconds for one time constant. This software damping is in addition to sensor module response time.

PERFORMANCE SPECIFICATIONS

(Zero-based spans, reference conditions, silicone oil fill, 316 SST isolating diaphragms, 4–20 mA analog output, and digital trim values equal to the span setpoints.)

Models 3051CD/CG–Differential, Gage

Accuracy

±0.075% of span.

±0.100% of span for Model 3051CD Range 1.

Note

For rangedowns greater than 10:1 of URL (15:1 for Model 3051CD Range 1), accuracy =

$$\pm\left[0.025 + 0.005\left(\frac{\text{URL}}{\text{Span}}\right)\right]\% \text{ of Span}$$

Improved! **Ambient Temperature Effect per 50 °F (28 °C)**

±(0.0125% URL + 0.0625% span) spans from 1:1 to 10:1.

±(0.025% URL + 0.125% span) spans from 10:1 to 100:1.

Range 1: ±(0.1% URL + 0.25% span).

Static Pressure Effect (Model 3051CD only)

Zero Error (can be calibrated out at line pressure)

±0.1% of URL/1,000 psi (6.9 MPa) for line pressures from 0 to 2,000 psi (0 to 13.7 MPa).

±0.2% of URL/1,000 psi (6.9 MPa) for line pressures above 2,000 psi (13.7 MPa).

Range 1: ±0.25% of URL/1,000 psi (6.9 MPa).

Span Error *

±0.2% of reading/1,000 psi (6.9 MPa).

±0.4% of reading/1,000 psi (6.9 MPa) for Range 1.

** Range 4 and 5: See Page 2-21 for calibration procedure.*

NEW! **Total Performance****

±0.25% of span for ±50 °F (28 °C) temperature changes, up to 1,000 psi (6.9 MPa) line pressure, from 1:1 to 5:1 rangedown.

*** Total Performance is based on the combined errors of reference accuracy, ambient temperature effect, and span line pressure effect.*

Improved! **Stability**

±0.25% of URL for 5 years for ±50 °F (28 °C) temperature changes and up to 1,000 psi (6.9 MPa) line pressure.

Range 1: ±0.2% of URL for 1 year.

Mounting Position Effect

Zero shifts up to 2.5 inH_2O (0.62 kPa), which can be calibrated out. No span effect.

Model 3051P–*Reference Class*

Accuracy
±0.05% of span.

Ambient Temperature Effect per 50 °F (28 °C)
±(0.006% URL + 0.03% span).

Static Pressure Effect
Zero Effect (can be calibrated out at line pressure)
±0.04% URL per 1,000 psi (6.9 MPa).

Span Effect
±0.10% of reading per 1,000 psi (6.9 MPa).

Improved!

Stability
±0.25% of URL for 5 years for ±50 °F (28 °C) temperature changes and up to 1,000 psi (6.9 MPa) line pressure.

Mounting Position Effect
Zero shifts up to 1.25 inH_2O (0.31 kPa), which can be calibrated out. No span effect.

Total Performance*
±0.14% of span for ±50 °F (28 °C) temperature changes, up to 1,000 psi (6.9 MPa) line pressure, from 1:1 to 10:1 rangedown.

* *Total Performance is based on the combined errors of reference accuracy, ambient temperature effect, and span line pressure effect.*

Model 3051H–High Process Temperatures

Accuracy
±0.75% of span.
For rangedowns greater than 10:1 of URL, accuracy =

$$\pm\left[0.025 + 0.005\left(\frac{\text{URL}}{\text{Span}}\right)\right]\% \text{ of Span}$$

Ambient Temperature Effect per 50 °F (28 °C)
±(0.025% URL + 0.125% span + 0.35 inH_2O).

For spans below 30:1 rangedown:
±(0.035% URL + 0.125% span + 0.35 inH_2O).

Static Pressure Effect (Model 3051HD only)
Zero Error (can be calibrated out at line pressure)
±0.1% of URL/1,000 psi (6.9 MPa) for line pressures from 0 to 2,000 psi (0 to 13.7 MPa).

±0.2% of URL/1,000 psi (6.9 MPa) for line pressures above 2,000 psi (13.7 MPa).

Span Error*
±0.2% of reading/1,000 psi (6.9MPa).

* *Range 4 and 5: See Page 2-21 for calibration procedure.*

Stability
Ranges 2 and 3: ±0.1% of URL for 12 months.

Ranges 4 and 5: ±0.2% of URL for 12 months.

Mounting Position Effect
Zero shifts up to 5 inH_2O (127 inH_2O), which can be calibrated out. No span effect.

Model 3051L–Liquid Level

Accuracy

±0.075% of span.

For rangedowns greater than 10:1 of URL, accuracy =

$$\pm\left[0.025 + 0.005\left(\frac{\text{URL}}{\text{Span}}\right)\right]\% \text{ of Span}$$

Ambient Temperature Effect per 50 °F (28 °C)

±(0.025% URL + 0.125% span + 0.5 inH_2O).

For spans below 30:1 rangedown:
±(0.035% URL + 0.125% span + 0.5 inH_2O).

Stability

Ranges 2 and 3: ±0.1% of URL for 12 months.

Range 4: ±0.2% of URL for 12 months.

Mounting Position Effect

With liquid level diaphragm in vertical plane, zero shift of up to 1 inH_2O (25.4 mmH_2O). With diaphragm in horizontal plane, zero shift of up to 5 inH_2O (127 mmH_2O) plus extension length on extended units. All zero shifts can be calibrated out. No span effect.

Model 3051T–Gage and Absolute
Model 3051CA–Absolute

Accuracy

±0.075% of span.

For rangedowns greater than 10:1 of URL, accuracy =

$$\pm\left[0.0075\left(\frac{\text{URL}}{\text{Span}}\right)\right]\% \text{ of Span}$$

For Model 3051CA Range 0 with rangedowns greater than 5:1 of URL, accuracy =

$$\pm\left[0.025 + 0.01\left(\frac{\text{URL}}{\text{Span}}\right)\right]\% \text{ of Span}$$

NEW!

Total Performance** (Ranges 1–4 only)

±0.25% of URL for ±50 °F (28 °C) temperature changes, from 1:1 to 5:1 rangedown.

** *Total Performance is based on the combined errors of reference accuracy and ambient temperature effect.*

Ambient Temperature Effect per 50 °F (28 °C)

±(0.025% URL + 0.125% span) from1:1 to 30:1
±(0.035% URL + 0.125% span) from 30:1 to 100:1
Range 0: ±(0.1% URL + 0.25% span)
Range 5: ±(0.1% URL + 0.15% span)

Model 3051T Range 1:
±(0.025% URL + 0.125% span) from 1:1 to 10:1.
±(0.05% URL + 0.125% span) from 10:1 to 100:1.

NEW!

Stability

Model 3051CA:
Ranges 1–5:±0.1% of URL for 12 months.
Range 0: ±0.2% of URL for 12 months

Model 3051T:
±0.25% of span for 5 years for ±50 °F (28 °C) temperature changes.

Mounting Position Effect

Zero shifts up to 0.09 psi (0.62 kPa), which can be calibrated out.
No span effect.

All Models

The Model 3051 maintains a specification conformance of at least $3\sigma^{(1)}$.

Accuracy

Stated reference accuracy includes hysteresis, terminal-based linearity, and repeatability of the pressure sensor.

Response Time

Dead Time (T_d):	45 milliseconds (nominal)
Time Constant (T_c)$^{(2)}$:	55 milliseconds
Update Rate:	20 times per second (minimum)

Vibration Effect

Less than ±0.1% of URL per g when tested from 15 to 2,000 Hz in any axis relative to pipe-mounted process conditions.

Power Supply Effect

Less than 0.005% of calibrated span per volt.

RFI Effects

±0.1% of span from 20 to 1,000 MHz, and for field strength up to 30 V/m.

Transient Protection (Option Code T1)

Meets IEEE Standard 587, Category B
1kV crest (10 × 1,000 microseconds)
3kV crest (8 × 20 microseconds)
6kV crest (1.2 × 50 microseconds).

Meets IEEE Standard 472, Surge Withstand Capability
SWC 2.5kV crest, 1 MHz wave form.

General Specifications

Response Time	< 1 nanosecond
Peak Surge Current	5,000 amps to housing
Peak Transient Voltage	100 V dc
Loop Impedance	< 25 ohms
Applicable Standards	IEC 801-4, IEC 801-5.

Note:
Calibrations at 68 °F (20 °C) per ANSI Z210.1.

(1) Sigma (σ) is a statistical symbol to designate the standard deviation from the mean value of a normal distribution.
(2) Dependent on temperature, fill fluid, and range.

PHYSICAL SPECIFICATIONS

Electrical Connections

½–14 NPT, PG 13.5, G ½, and M20 x 1.5 (CM20) conduit. HART interface connections permanently fixed to terminal block.

Process Connections

All Models except 3051L and 3051T

¼–18 NPT on 2⅛ -in. centers;
½–14 NPT on 2-, 2⅛ -, or 2¼-in. centers.

Model 3051L

High pressure side: 2-, 3-, or 4-in., Class 150, 300 or 600 flange; 50, 80, or 100 mm, PN 40 or 10/16 flange.

Low pressure side: ¼–18 NPT on flange. ½–14 NPT on adapter.

Model 3051T

¼–18, ½–14 NPT female, G½ A DIN 16288 Male (Available in SST for Range 1–4 transmitters only), or Autoclave type F-250-C (Pressure relieved 9/16 –18 gland thread; ¼ OD high pressure tube 60° cone; Available in SST for Range 5 transmitters only).

Process-Wetted Parts

Process Isolating Diaphragms

Isolating Diaphragm Material	3051CD/CG	3051T	3051CA	3051P	3051H	3051L
316L SST	•	•	•	•	•	See Below
Hastelloy® C-276	•	•	•		•	
Monel®	•		•			
Tantalum	•				•	
Gold-plated Monel	•		•			

Drain/Vent Valves

316 SST, Hastelloy C, or Monel material
(Monel not available with Model 3051L or 3051H).

Process Flanges and Adapters

Plated carbon steel, CF-8M (Cast version of 316 SST, material per ASTM-A743), Hastelloy C, or Monel.

Wetted O-rings

Glass-filled TFE (Graphite-filled TFE with isolating diaphragm Option Code 6).

Model 3051L Process Wetted Parts

Flanged Process Connection (Transmitter High Side)

Process diaphragms, including process gasket surface
316L SST, Hastelloy C-276, or tantalum.

Extension
CF-3M (cast version of 316L SST, material per ASTM-A743) or Hastelloy C.
Fits schedule 40 and 80 pipe.

Mounting Flange
Cadmium-plated CS or SST.

Reference Process Connection (Transmitter Low Side)

Isolating Diaphragms
316L SST or Hastelloy C-276.

Reference Flange and Adapter
CF-8M (Cast version of 316 SST, material per ASTM-A743).

Non-Wetted Parts

Electronics Housing
Low-copper aluminum or CF-8M (Cast version of 316 SST, material per ASTM-A743). NEMA 4X, CSA Enclosure Type 4X, IP 65, IP 66, IP 68.

Coplanar Sensor Module Housing
CF-3M (Cast version of 316L SST, material per ASTM-A743).

Bolts
Plated carbon steel per ASTM A449, Type 1; Austenitic 316 SST, ANSI/ASTM-A-193-B7M, or Monel.

Sensor Module Fill Fluid
Silicone or inert halocarbon (inert not available with Model 3051CA or Model 3051H). Model 3051T uses Fluorinert® FC-43.

Process Fill Fluid (Model 3051L and 3051H only)
3051L: Syltherm XLT, D.C. Silicone 704, D.C. Silicone 200, inert, glycerin and water, Neobee M-20, propylene glycol and water, or Syltherm 800. 3051H: inert, Neobee M-20, or D.C. 200 Silicone.

Paint (aluminum housing only)
Polyurethane.

Cover O-rings
Buna-N.

Shipping Weights

TABLE 1. Transmitter Weights without Options.

Transmitter	Add Weight in lb (kg)
Model 3051C/P	5.5 (2.5)
Model 3051L	See Table 2
Model 3051H	13.1 (6.0)
Model 3051T	3.0 (1.4)

TABLE 2. Model 3051L Weights without Options.

Flange	Flush	2-in. Ext.	4-in. Ext.	6-in. Ext.
2-in., 150	12.0 (5.5)	—	—	—
3-in., 150	17.0 (7.7)	19.0 (8.6)	20.0 (9.1)	21.0 (9.5)
4-in., 150	23.0 (10.5)	26.0 (11.8)	28.0 (12.7)	30.0 (13.6)
2-in., 300	17.0 (7.7)	—	—	—
3-in., 300	22.0 (10.0)	24.0 (10.9)	25.0 (11.4)	26.0 (11.8)
4-in., 300	32.0 (14.5)	35.0 (15.9)	37.0 (16.8)	39.0 (17.7)
2-in., 600	14.7 (6.7)	NA	NA	NA
3-in., 600	24.7 (11.2)	26.7 (12.1)	27.7 (12.6)	28.7 (13.0)
DN 50 / PN 40	13.3 (6.0)	NA	NA	NA
DN 80 / PN 40	19.0 (8.6)	21.0 (9.5)	22.0 (10)	23.0 (10.4)
DN 100 / PN 10/16	17.3 (7.9)	19.3 (8.8)	20.3 (9.3)	21.3 (9.7)
DN 100 / PN 40	22.7 (10.3)	24.7 (11.3)	25.7 (11.7)	26.7 (12.1)

TABLE 3. Transmitter Option Weights.

Code	Option	Add lb (kg)
J, K, L	Stainless Steel Housing	3.1 (1.4)
M5	LCD Meter for Aluminum Housing	0.5 (0.2)
M6	LCD Meter for SST Housing	1.25 (0.6)
B4	SST Mounting Bracket for *Coplanar* Flange	1.0 (0.5)
B1, B2, B3	Mounting Bracket for Traditional Flange	2.3 (1.0)
B7, B8, B9	Mounting Bracket for Traditional Flange	2.3 (1.0)
BA, BC	SST Bracket for Traditional Flange	2.3 (1.0)
B5, B6	Mounting Bracket for Model 3051H	2.9 (1.3)
H2	Traditional Flange	2.4 (1.1)
H3	Traditional Flange	2.7 (1.2)
H4	Traditional Flange	2.6 (1.2)
H7	Traditional Flange	2.5 (1.1)
F1, G1, FC	Level Flange—3 in., 150	10.8 (4.9)
F2, G2, FD	Level Flange—3 in., 300	14.3 (6.5)
FA	Level Flange—2 in., 150	10.7 (4.8)
FB	Level Flange—2 in., 300	14.0 (6.3)

TABLE 4. Transmitter Weights without Options.

Manifold Model(1)	Manifold Weight(2)
0305AC2	4.5 (2.0)
0305AC3	5.0 (2.3)
0305AC7	4.7 (2.1)
0305AC8	5.2 (2.4)
0305AT2	5.9 (2.7)
0305AT3	6.4 (2.9)
0305AT7	6.1 (2.8)
0305AT8	6.6 (3.0)

(1) Refer to PDS 00813-0100-4733 for additional information on Integral Manifold model numbers and weights.

(2) For total weight, add the weight of the transmitter and options to the manifold weight.

HAZARDOUS LOCATIONS CERTIFICATIONS

A stainless steel certification tag is provided when an optional approval is specified.

Factory Mutual (FM) Approvals

E5 Explosion Proof for Class I, Division 1, Groups B, C, and D. Dust-Ignition Proof for Class II, Division 1, Groups E, F, and G. Suitable for Class III, Division 1, hazardous locations. Factory Sealed.

I5 Intrinsically Safe for use in Class I, Division 1, Groups A, B, C, and D; Class II, Division 1, Groups E, F, and G; Class III, Division 1 when connected in accordance with Rosemount drawing 03031-1019. Temperature Codes T3 and T4. Non-incendive for Class I, Division 2, Groups A, B, C, and D. Factory Sealed.

K5 Combined **E5** and **I5**.

FM Approved Entity Parameters for Model 3051C (1)	FM Approved for Class I, II, III, Division 1 and 2, Groups
V_{Max} = 40 V dc	A–G
I_{Max} = 165 mA	A–G
I_{Max} = 225 mA	C–G
I_{Max} = 160 mA (Option Code T1)	A–G
P_{Max} = 1 W	A–G
C_i = 0.01 µF (Output Code A)	A–G
C_i = 0.042 µF (Output Code M)	A–G
L_i = 10 µH	A–G
L_i = 1.05 mH (Output Code A with T1)	A–G
L_i = 0.75 mH (Output Code M with T1)	A–G

(1) When connected in accordance with Rosemount drawing 03031-1019.

BASEEFA/CENELEC Intrinsic Safety Certification

I1 EEx ia IIC T5 (T_{amb} = –60 to 40 °C).
EEx ia IIC T4 (T_{amb} = –60 to 70 °C).

CENELEC Approved Entity Parameters

$U_{Max:in}$ = 30 V
$I_{Max:in}$ = 200 mA
$W_{Max:in}$ = 0.9 W
C_{eq} = 0.012 µF

BASEEFA Non-incendive Type N Certification

N1 Ex N IIC T5 (T_{amb} = –40 to 70 °C).

Special Conditions for Safe Use:
When the optional transient protection terminal block is installed the apparatus is not capable of withstanding a 500 V rms test to case. This must be taken into account in installations in which the transient protection terminal block is used. One method of taking this into account is to ensure that the supply to the apparatus is galvanically isolated.

CESI/CENELEC Flameproof Certification

E8 EEx d IIC T6 (T_{amb} = 40 °C).
EEx d IIC T5 (T_{amb} = 70 °C).

Japanese Industrial Standard (JIS) Flameproof Certification

E4 *Model 3051C*:
Ex d IIB T4 + sG4 (T_{amb} = 60 °C).

Model 3051T:
Ex d IIB T5 (T_{amb} = 60 °C).

Canadian Standards Association (CSA) Approvals

C6 Explosion Proof for Class I, Division 1, Groups B, C, and D. Dust-Ignition Proof for Class II, Division 1, Groups E, F, and G. Suitable for Class III, hazardous locations; factory sealed. Suitable for Class I, Division 2, Groups A, B, C, and D.

Intrinsically Safe for Class I, Division 1, Groups A, B, C, and D when connected in accordance with Rosemount drawing 03031-1024. Temperature Code T3C.

K6 Combined **C6, I1,** and **E8**.

	CSA Approved Barriers for Model 3051C (1)	CSA Approved for Class I, Division 1 and 2, Groups
Output Code A	≤ 30 V, ≥ 330 Ω ≤ 28 V, ≥ 300 Ω ≤ 25 V, ≥ 200 Ω ≤ 22 V, ≥ 180 Ω	A–D
	≤ 30 V, ≥ 150 Ω	C–D
Output Code M	Supply ≤ 28V, ≥ 300 Ω Return ≤ 10 V, ≥ 47 Ω	A–D
	Supply ≤ 30 V, ≥ 150 Ω Return ≤ 10 V, ≥ 47 Ω	C–D

(1) When connected in accordance with Rosemount drawing 3031-1024.

Standards Association of Australia (SAA)

Intrinsic Safety Certification

I7 Ex ia IIC T4 (T_{amb} = 70 °C).
Ex ia IIC T5 (T_{amb} = 40 °C).

Special Conditions for safe use:
Observe barriers/entity parameters during installation.

SAA Approved Entity Parameters
U_{Max}= 30 V
I_{Max}= 200 mA (160 mA with Option Code T1)
P_{Max} = 0.9 W
C_l = 0.01 µF (Output Code A)
C_l = 0.042 µF (Output Code M)
L_l = 10 µH
L_l = 1.05 mH (Output Code A with T1)
L_l = 0.75 mH (Output Code M with T1)

Explosion Proof (Flameproof) Certification

E7 Ex d IIC T6 (T_{amb} = 40 °C) / DIP T6 (T_{amb} = 40 °C).
Ex d IIC T5. (T_{amb} = 80 °C) / DIP T5 (T_{amb} = 80 °C).

Type N Certification

N7 Ex n IIC T6 (T_{amb} = 70 °C).
Ex n IIC T5. (T_{amb} = 40 °C).

Special Conditions for Safe Use:
Seal unused conduit entries with a suitable conduit plug to maintain the IP 40 degree of protection. The conduit plug must be of the type that requires a tool for removal.

ORDERING INFORMATION

TABLE 5-6. Model 3051C Differential, Gage, and Absolute Pressure Transmitters. — = Not Applicable • = Applicable

Model	Transmitter Type (Select One)	CD	CG	CA
3051CD	Differential Pressure Transmitter	•	—	—
3051CG	Gage Pressure Transmitter	—	•	—
3051CA	Absolute Pressure Transmitter	—	—	•

Code	PRESSURE RANGES (URL) (Select One) Model 3051CD	Model 3051CG	Model 3051CA	CD	CG	CA
0	Not Applicable	Not Applicable	0–0.167 to 0–5 psia (0–8.6 to 0–260 mmHga)	—	—	•
1	0–0.5 to 0–25 inH_2O (0–0.12 to 0–6.22 kPa)	Not Applicable	0–0.3 to 0–30 psia (0–2.07 to 0–206.8 kPa)	•	—	•
2	0–2.5 to 0–250 inH_2O (0–0.62 to 0–62.2 kPa)	0–2.5 to 0–250 inH_2O (0–0.62 to 0–62.2 kPa)	0–1.5 to 0–150 psia (0–10.34 to 0–1034.2 kPa)	•	•	•
3	0–10 to 0–1,000 inH_2O (0–2.48 to 0–248 kPa)	0–10 to 0–1,000 inH_2O (0–2.48 to 0–248 kPa)	0-8 to 0-800 psia (0–55.16 to 0–5515.8 kPa)	•	•	•
4	0–3 to 0–300 psi (0–20.7 to 0–2070 kPa)	0–3 to 0–300 psig (0–20.7 to 0–2070 kPa)	0–40 to 0–4,000 psia (0–275.8 to 0–27580 kPa)	•	•	•
5	0–20 to 0–2,000 psi (0–138 to 0–13800 kPa)	0–20 to 0–2,000 psig (0–138 to 0–13800 kPa)	Not Applicable	•	•	—

Code	Output	CD	CG	CA
A	4–20 mA with Digital Signal Based on *HART* Protocol	•	•	•
M(1)	Low-Power, 1–5 V dc with Digital Signal Based on *HART* Protocol (See Option C2 for 0.8–3.2 V dc)	•	•	•

Code	MATERIALS OF CONSTRUCTION Process Flange Type	Flange Material	Drain/Vent	Flange Adapters	CD	CG	CA
5	*Coplanar*	Plated CS	SST	Plated CS	•	•	•
2	*Coplanar*	SST	SST	SST	•	•	•
3(2)	*Coplanar*	*Hastelloy C*	*Hastelloy C*	*Hastelloy C*	•	•	•
4	*Coplanar*	*Monel*	*Monel*	*Monel*	•	•	•
8(2)	*Coplanar*	Plated CS	*Hastelloy C*	Plated CS	•	•	•
7(2)	*Coplanar*	SST	*Hastelloy C*	SST	•	•	•
0	Alternate Flange–See Options H2, H3, H4, H7, F1, F2, G1, G2, FA, FB, FC, FD, or S5				•	•	•

Code	Isolating Diaphragm	CD	CG	CA
2	316L SST	•	•	•
3(2)	*Hastelloy C-276*	•	•	•
4	*Monel*	•	•	•
5	Tantalum (Available on Model 3051CD and CG, Ranges 2–5 only. Not available on Model 3051CA)	•	•	—
6	Gold-plated *Monel*	•	•	•
7	Gold-Plated SST	•	•	•

Code	O-ring	CD	CG	CA
A	Glass-filled TFE	•	•	•
B	Graphite-filled TFE (for use with Isolating Diaphragm Option Code 6, Gold-plated Monel)	•	•	•

Code	Fill Fluid	CD	CG	CA
1	Silicone	•	•	•
2	Inert fill (Halocarbon)	•	•	—

Code	Housing Material	Conduit Entry Size	CD	CG	CA
A	Polyurethane-covered Aluminum	½–14 NPT	•	•	•
B	Polyurethane-covered Aluminum	M20 x 1.5 (CM20)	•	•	•
C	Polyurethane-covered Aluminum	PG 13.5	•	•	•
D	Polyurethane-covered Aluminum	G ½	•	•	•
J	SST	½–14 NPT	•	•	•
K	SST	M20 x 1.5 (CM20)	•	•	•
L	SST	PG 13.5	•	•	•

(1) Not available with hazardous locations certification Option Codes I1, N1, E4, and K6.

(2) Meets NACE material recommendations per MR 01-75.

TABLE 5-6. (continued).

Code	Options	CD	CG	CA
	ALTERNATE FLANGE OPTIONS (Requires Materials of Construction Code 0)			
H2	Traditional Flange, 316 SST, SST Drain/Vent, SST Flange Adapter	•	•	•
H3[1]	Traditional Flange, *Hastelloy C*, *Hastelloy C* Drain/Vent, *Hastelloy C* Flange Adapter	•	•	•
H4	Traditional Flange, *Monel*, *Monel* Drain/Vent, *Monel* Flange Adapter	•	•	•
H7[1]	Traditional Flange, 316 SST, *Hastelloy C* Drain/Vent, 316 SST Flange Adapter	•	•	•
FA	Level Flange, SST, 2 in., ANSI Class 150, Vertical Mount	•	•	•
FB	Level Flange, SST, 2 in., ANSI Class 300, Vertical Mount	•	•	•
FC	Level Flange, SST, 3 in., ANSI Class 150, Vertical Mount	•	•	•
FD	Level Flange, SST, 3 in., ANSI Class 300, Vertical Mount	•	•	•
FP	DIN Level Flange, SST, DN 50, PN 40, Vertical Mount	•	•	•
FQ	DIN Level Flange, SST, DN 80, PN 40, Vertical Mount	•	•	•
F1	Level Flange, SST, 3 in., ANSI Class 150, Horizontal Mount	•	•	•
F2	Level Flange, SST, 3 in., ANSI Class 300, Horizontal Mount	•	•	•
G1	Level Flange, CS, 3 in., ANSI Class 150, Horizontal Mount	•	•	•
G2	Level Flange, CS, 3 in., ANSI Class 300, Horizontal Mount	•	•	•
	INTEGRAL MOUNT MANIFOLD			
S5	Assemble to Model 305 Integral Manifold (Refer to PPL 00814-0100-4733 for Pricing Information)	•	•	•
	INTEGRAL MOUNT PRIMARY ELEMENTS			
S4[2]	Factory Assembly to Rosemount Primary Element (Model 1295 Annubar or Model 1195 Integral Orifice)	•	•	•
	DIAPHRAGM SEAL ASSEMBLIES			
S1	One Diaphragm Seal (Direct Mount or Capillary Connection Type)	•	•	•
S2	Two Diaphragm Seals (Direct Mount or Capillary Connection Type)	•	—	—
	All Welded Diaphragm Seal Systems (for high vacuum applications)			
S7[3]	One Diaphragm Seal, All-welded System (Capillary Connection Type)	•	•	•
S8[3]	Two Diaphragm Seals, All-welded System (Capillary Connection Type)	•	—	—
S0[3]	One Diaphragm Seal, All-welded System (Direct Mount Connection Type)	•	•	•
S9[3]	Two Diaphragm Seals, All-welded System (One Direct Mount and One Capillary Connection Type)	•	—	—
	MOUNTING BRACKETS			
B4	*Coplanar* Flange Bracket for 2-in. Pipe or Panel Mounting, all SST	•	•	•
B1	Traditional Flange Bracket for 2-in. Pipe Mounting, CS Bolts	•	•	•
B2	Traditional Flange Bracket for Panel Mounting, CS Bolts	•	•	•
B3	Traditional Flange Flat Bracket for 2-in. Pipe Mounting, CS Bolts	•	•	•
B7	B1 Bracket with Series 300 SST Bolts	•	•	•
B8	B2 Bracket with Series 300 SST Bolts	•	•	•
B9	B3 Bracket with Series 300 SST Bolts	•	•	•
BA	SST B1 Bracket with Series 300 SST Bolts	•	•	•
BC	SST B3 Bracket with Series 300 SST Bolts	•	•	•
	HAZARDOUS LOCATIONS CERTIFICATIONS			
E5	FM Explosion-Proof Approval	•	•	•
I5	FM Non-incendive and Intrinsic Safety Approval	•	•	•
K5	FM Explosion-Proof and Intrinsic Safety Approval	•	•	•
C6	CSA Explosion-Proof and Intrinsic Safety Approval (Requires 42.4 V dc max. power supply)	•	•	•
K6[4]	Combination of CSA and CENELEC Explosion-Proof and Intrinsic Safety Approval	•	•	•
I1[4]	BASEEFA/CENELEC Intrinsic Safety Certification	•	•	•
N1[4]	BASEEFA Type N Certification	•	•	•
E8	CESI/CENELEC Flameproof Certification	•	•	•
E4[4]	JIS Flameproof Certification	•	•	•
E7	SAA Flameproof Certification	•	•	•
I7	SAA Intrinsic Safety Certification	•	•	•
N7	SAA Type N Certification	•	•	•
	BOLTING OPTIONS			
L4	Austenitic 316 SST Bolts	•	•	•
L5	ANSI/ASTM-A-193-B7M Bolts	•	•	•
L6	*Monel* Bolts	•	•	•
	METERS			
M5	LCD Meter for Aluminum Housing (Housing Codes A, B, C, and D only)	•	•	•
M6	LCD Meter for SST Housing (Housing Codes J, K, and L only)	•	•	•

(1) Meets NACE material recommendations per MR 01-75.
(2) With the primary element installed, the maximum operating pressure will equal the lesser of either the transmitter or the primary element. Option is available for factory assembly to range 1–4 transmitters only.
(3) Standard flange and adapter bolts are austenitic 316 SST.
(4) Not available with low-power Option Code M.

TABLE 5-6. (continued).

Code	Options (continued)	CD	CG	CA
	OTHER OPTIONS			
Q4	Calibration Data Sheet	•	•	•
Q8[1]	Material Traceability Certification per EN 10204 3.1B	•	•	•
J1[2]	Local Zero Adjustment Only	•	•	•
J3[2]	No Local Zero or Span Adjustment	•	•	•
T1[3]	Transient Protection Terminal Block	•	•	•
C1	Custom Software Configuration (Completed CDS 00806-0100-4001 required with order)	•	•	•
C2	0.8–3.2 V dc Output with Digital Signal Based on *HART* Protocol (Output Code M only)	•	•	•
C3	Gage Calibration (Model 3051CA4 only)	—	—	•
C4[4]	Analog Output Levels Compliant with NAMUR Recommendation NE43, 18-January-1994	•	•	•
P1	Hydrostatic Testing	•	•	•
P2	Cleaning for Special Service	•	•	•
P3	Cleaning for <1 PPM Chlorine/Fluorine	•	•	•
D3	¼–18 NPT Process Connections (No flange adapters) { 316 SST / *Hastelloy* / *Monel* }	• / • / •	• / • / •	• / • / •
D7	*Coplanar* Flange Without Drain/Vent Ports)	•	•	•
D8	Ceramic Ball Drain/Vents	•	•	•
D9	JIS Process Connection–RC ¼ Flange with RC ½ Flange Adapter { *Carbon Steel* / 316 SST }	• / •	• / •	• / •
P9	4,500 psig Static Pressure Limit (Model 3051CD Ranges 2–5 only)	•	—	—
V5	External Ground Screw Assembly	•	•	•

Typical Model Number: 3051CD 2 A 2 2 A 1 A B4

(1) This option is available for the sensor module housing and Coplanar or traditional flanges and adapters (Model 3051C/P).
This option is available for the sensor module housing and low-volume Coplanar flange and adapter (Model 3051C with Option Code S1).
(2) Local zero and span adjustments are standard unless Option Codes J1 or J3 is specified.
(3) Not available with hazardous locations certification Option Code I1 or K6.
(4) NAMUR-Compliant operation is pre-set at the factory and cannot be changed to standard operation in the field.

TABLE 5-7. Model 3051L Liquid-level Transmitter.

Model	Transmitter Type (Select One)
3051L	Flange-Mounted Liquid Level Transmitter

Code	Pressure Ranges (URL) (Select One)
2	0–2.5 to 0–250 inH_2O (0–0.62 to 0–62.2 kPa)
3	0–10 to 0–1,000 inH_2O (0–2.48 to 0–248 kPa)
4	0–83.1 to 0–8,310 inH_2O (0–20.07 to 0–2070 kPa)

Code	Output
A	4–20 mA with Digital Signal Based on *HART* Protocol
M(1)	Low-Power, 1–5 V dc with Digital Signal Based on *HART* Protocol (See Option Code C2 for 0.8–3.2 V dc Output)

Code	HIGH PRESSURE SIDE Diaphragm Size	Material	Extension Length
G0	2 in./DN 50	316L SST	Flush Mount Only
H0	2 in./DN 50	*Hastelloy*	Flush Mount Only
J0	2 in./DN 50	Tantalum	Flush Mount Only
A0	3 in./DN 80	316L SST	Flush Mount
A2	3 in./DN 80	316L SST	2 in./50 mm
A4	3 in./DN 80	316L SST	4 in./100 mm
A6	3 in./DN 80	316L SST	6 in./150 mm
B0	4 in./DN 100	316L SST	Flush Mount
B2	4 in./DN 100	316L SST	2 in./50 mm
B4	4 in./DN 100	316L SST	4 in./100 mm
B6	4 in./DN 100	316L SST	6 in./150 mm
C0	3 in./DN 80	*Hastelloy*	Flush Mount
C2	3 in./DN 80	*Hastelloy*	2 in./50 mm
C4	3 in./DN 80	*Hastelloy*	4 in./100 mm
C6	3 in./DN 80	*Hastelloy*	6 in./150 mm
D0	4 in./DN 100	*Hastelloy*	Flush Mount
D2	4 in./DN 100	*Hastelloy*	2 in./50 mm
D4	4 in./DN 100	*Hastelloy*	4 in./100 mm
D6	4 in./DN 100	*Hastelloy*	6 in./150 mm
E0	3 in./DN 80	Tantalum	Flush Mount Only
F0	4 in./DN 100	Tantalum	Flush Mount Only

When specifying this option code, a lower housing must be selected from the flushing connection options table.

NOTE
Extension diameters are sized to fit Schedule 80 pipe. Consult factory for Schedule 40 pipe.

Code	MOUNTING FLANGE Size	Rating		Material	Applicable with these High Pressure Side Diaphragm Sizes
M	2 in.	Class 150	ANSI	CS	2 in./DN 50
A	3 in.	Class 150	ANSI	CS	3 in./DN 80
B	4 in.	Class 150	ANSI	CS	4 in./DN 100
N	2 in.	Class 300	ANSI	CS	2 in./DN 50
C	3 in.	Class 300	ANSI	CS	3 in./DN 80
D	4 in.	Class 300	ANSI	CS	4 in./DN 100
P	2 in.	Class 600	ANSI	CS	2 in./DN 50
E	3 in.	Class 600	ANSI	CS	3 in./DN 80
X	2 in.	Class 150	ANSI	SST	2 in./DN 50
F	3 in.	Class 150	ANSI	SST	3 in./DN 80
G	4 in.	Class 150	ANSI	SST	4 in./DN 100
Y	2 in.	Class 300	ANSI	SST	2 in./DN 50
H	3 in.	Class 300	ANSI	SST	3 in./DN 80
J	4 in.	Class 300	ANSI	SST	4 in./DN 100
Z	2 in.	Class 600	ANSI	SST	2 in./DN 50
L	3 in.	Class 600	ANSI	SST	3 in./DN 80
Q	DN 50	PN 10-40	DIN	CS	2 in./DN 50
R	DN 80	PN 40	DIN	CS	3 in./DN 80
S	DN 100	PN 40	DIN	CS	4 in./DN 100
V	DN 100	PN 10/16	DIN	CS	4 in./DN 100
K	DN 50	PN 10-40	DIN	SST	2 in./DN 50
T	DN 80	PN 40	DIN	SST	3 in./DN 80
U	DN 100	PN 40	DIN	SST	4 in./DN 100
W	DN 100	PN 10/16	DIN	SST	4 in./DN 100

Code	Process Fill–High Pressure Side	Temperature Limits
A	*Syltherm* XLT	–100 to 300 °F (–73 to 135 °C)
C	*D. C. Silicone 704*	60 to 400 °F (15 to 205 °C)
D	*D. C. Silicone 200*	–40 to 400 °F (–40 to 205 °C)
H	Inert (Halocarbon)	–50 to 350 °F (–45 to 177 °C)
G	Glycerine and Water	0 to 200 °F (–17 to 93 °C)
N	*Neobee M-20*	0 to 400 °F (–17 to 205 °C)
P	Propylene Glycol and Water	0 to 200 °F (–17 to 93 °C)

(1) Not available with hazardous locations certification Option Codes I1, N1, E4, and K6.

TABLE 5-7. (continued).

Code	LOW PRESSURE SIDE Configuration	Flange Adapter	Diaphragm Material	Sensor Fill Fluid	
11	Gage	SST	316L SST	Silicone	
21	Differential	SST	316L SST	Silicone	
22	Differential	SST	*Hastelloy C-276*	Silicone	
2A	Differential	SST	316L SST	Inert	
2B	Differential	SST	*Hastelloy C-276*	Inert	
31	Remote Seal	SST	316L SST	Silicone	(Requires Option Code S1)

Code	O-ring Material
A	Glass-filled TFE

Code	Housing Material	Conduit Entry Size
A	Polyurethane-Covered Aluminum	1/2–14 NPT
B	Polyurethane-Covered Aluminum	M20 x 1.5 (CM20)
C	Polyurethane-Covered Aluminum	PG 13.5
D	Polyurethane-Covered Aluminum	G ½
J	SST	1/2–14 NPT
K	SST	M20 x 1.5 (CM20)
L	SST	PG 13.5

Code	Options
	DIAPHRAGM SEAL ASSEMBLIES
S1	One Diaphragm Seal (requires low pressure side Option Code 31 capillary connection type)
	HAZARDOUS LOCATIONS CERTIFICATIONS
E5	FM Explosion-Proof Approval
I5	FM Non-incendive and Intrinsic Safety Approval
K5	FM Explosion-Proof and Intrinsic Safety Approval
C6	CSA Explosion-Proof and Intrinsic Safety Approval (Requires 42.4 V dc max. power supply)
K6(1)	Combination of CSA and CENELEC Explosion-Proof and Intrinsic Safety Approval
I1(1)	BASEEFA/CENELEC Intrinsic Safety Certification
N1(1)	BASEEFA Type N Certification
E8	CESI/CENELEC Flameproof Certification
E4(1)	JIS Flameproof Certification
E7	SAA Flameproof Certification
I7	SAA Intrinsic Safety Certification
N7	SAA Type Certification
	BOLT FOR FLANGE AND ADAPTERS
L4	Austenitic 316 SST bolts
L5	ANSI/ASTM-A-193-B7M Bolts
	METERS
M5	LCD Meter for Aluminum Housing (Codes A, B, and C)
M6	LCD Meter for SST Housing (Codes J, K, and L)
	OTHER OPTIONS
Q4	Calibration Data Sheet
Q8(2)	Material Traceability Certification per EN 10204 3.1B
J1(3)	Local Zero Adjustment Only
J3(3)	No Local Zero or Span Adjustment
T1(4)	Transient Protection Terminal Block
C1	Custom Software Configuration (Completed CDS 00806-0100-4001 required with order)
C2	0.8–3.2 V dc Output with Digital Signal Based on *HART* Protocol (Output Code M only)
C4(5)	Analog Output Levels Compliant with NAMUR Recommendation NE43, 18-January-1994
S1	Assembly of One Remote Seal
D8	Ceramic Ball Drain/Vents
	FLUSHING CONNECTIONS
F_	See Table 5-8 for Availability
V5	External Ground Screw Assembly

TABLE 5-8. Lower Housing Flushing Connections Options.

Code	Flushing Connection Ring Material	Flushing Connections No.	Flushing Connections Size	Diaphragm Size 2 in.	3 in.	4 in.
F1	SST	1	¼	•	•	•
F2	SST	2	¼	•	•	•
F3(1)	*Hastelloy*	1	¼	•	•	•
F4(1)	*Hastelloy*	2	¼	•	•	•
FA	SST	0	—	•	—	—
FC(2)	*Hastelloy*	0	—	•	—	—
F7	SST	1	½	•	•	•
F8	SST	2	½	•	•	•
F9	*Hastelloy*	1	½	•	•	•
F0	*Hastelloy*	2	½	•	•	•

(1) Not available with Option Codes A0, B0, G0.

(2) Not Available with Option Code G0.

Typical Model Number: 3051L 2 A A0 A D 21 A A M5

(1) Not available with low-power Option Code M.

(2) This option is available for the diaphragm, upper housing, Coplanar flange, adapter, sensor module housing, lower housing/flushing connection, and extension.

(3) Local zero and span adjustments are standard unless Option Code J1 or J3 is specified.

(4) Not available with hazardous locations certification Option Code I1 or K6.

(5) NAMUR-Compliant operation is pre-set at the factory and cannot be changed to standard operation in the field.

TABLE 5-9. Model 3051H Pressure Transmitter for High-Temperature Processes.

Model	Transmitter Type (Select One)
3051HD	Differential Pressure Transmitter for High-Temperature Processes
3051HG	Gage Pressure Transmitter for High-Temperature Processes

Code	Pressure Ranges (URL) (Select One)
2	0–2.5 to 0–250 inH_2O (0–0.62 to 0–62.2 kPa)
3	0–10 to 0–1,000 inH_2O (0–2.48 to 0–248 kPa)
4	0–3 to 0–300 psig (0–20.7 to 0–2070 kPa)
5	0–20 to 0–2,000 psig (0–138 to 0–13800 kPa)

Code	Output
A	4–20 mA with Digital Signal Based on *HART* Protocol
M(1)	Low-Power, 1–5 V dc with Digital Signal Based on *HART* Protocol (See Option Code C2 for 0.8–3.2 V dc Output)

	PROCESS CONNECTION		
Code	Process Flange Material	Drain/Vent	Flange Adapters
2	SST	SST	SST
7(2)	SST	*Hastelloy*	SST

Code	Process Isolating Diaphragm
2	316L SST
3(2)	*Hastelloy C-276*
5	Tantalum

Code	O-Ring Material
A	Glass-Filled TFE

Code	Process Fill Fluid
D	*D.C.* 200 Silicone
H	Inert Fill
N	*Neobee* M-20

Code	Sensor Module Isolator Material
2	SST

Code	Sensor Module Fill Fluid
1	Silicone
2	Inert (Halocarbon)

Code	Housing Material	Conduit Entry Size
A	Polyurethane-covered Aluminum	½–14 NPT
B	Polyurethane-covered Aluminum	M20 x 1.5 (CM20)
C	Polyurethane-covered Aluminum	PG 13.5
D	Polyurethane-covered Aluminum	G ½
J	SST	½–14 NPT
K	SST	M20 x 1.5 (CM20)
L	SST	PG 13.5

(1) Not available with hazardous locations certification Option Codes I1, N1, E4, and K6.

(2) Meets NACE material recommendations per MR 01-75.

TABLE 5-9. (continued).

Code	Options
	INTEGRAL MOUNT PRIMARY ELEMENTS
S4[1]	Factory Assembly to Rosemount Primary Element (Model 1295 Annubar or Model 1195 Integral Orifice)
	MOUNTING BRACKETS
B5	Universal Mounting Bracket for 2-in.Pipe and Panel Mount, CS Bolts
B6	Universal Mounting Bracket for 2-in.Pipe and Panel Mount, SST Bolts
	HAZARDOUS LOCATIONS CERTIFICATIONS
E5	FM Explosion-Proof Approval
I5	FM Non-incendive and Intrinsic Safety Approval
K5	FM Explosion-Proof and Intrinsic Safety Approval
C6	CSA Explosion-Proof and Intrinsic Safety Approval (Requires 42.4 V dc max. power supply)
K6[2]	Combination of CSA and CENELEC Explosion-Proof and Intrinsic Safety Approval
I1[2]	BASEEFA/CENELEC Intrinsic Safety Certification
N1[2]	BASEEFA Type N Certification
E8	CESI/CENELEC Flameproof Certification
E4[2]	JIS Flameproof Certification
E7	SAA Flameproof Certification
I7	SAA Intrinsic Safety Certification
N7	SAA Type N Certification
	BOLT FOR FLANGE AND ADAPTERS
L4	Austenitic 316 SST Bolts
	METERS
M5	LCD Meter for Aluminum Housing (Housing Codes A, B, C, and D only)
M6	LCD Meter for SST Housing (Housing Codes J, K, and L only)
	OTHER OPTIONS
Q4	Calibration Data Sheet
Q8	Material Traceability per EN 10204 3.1B
J1[3]	Local Zero Adjustment Only
J3[3]	No Local Zero or Span Adjustment
T1[4]	Transient Protection Terminal Block
C1	Custom Software Configuration (Completed CDS 00806-0100-4001 required with order)
C2	0.8–3.2 V dc Output with Digital Signal Based on *HART* Protocol (Output Code M only)
C4[5]	Analog Output Levels Compliant with NAMUR Recommendation NE43, 18-January-1994
P1	Hydrostatic Testing
P2	Cleaning for Special Service
P3	Cleaning for <1 PPM Chlorine/Fluorine
D3	¼–18 NPT Process Connections (No flange adapters)
D8	Ceramic Ball Drain/Vents
V5	External Ground Screw Assembly
Typical Model Number:	**3051HG 2 A 2 2 A H 2 1 A B5**

(1) With the primary element installed, the maximum operating pressure will equal the lesser of either the transmitter or the primary element. Option is available for factory assembly to range 1–4 transmitters only.
(2) Not available with low power Option Code M.
(3) Local zero and span adjustments are standard unless Option Code J1 or J3 is specified.
(4) Not available with hazardous locations certification Option Code I1 or K6.
(5) NAMUR-Compliant operation is pre-set at the factory and cannot be changed to standard operation in the field.

TABLE 5-10. Model 3051P *Reference Class* Transmitter.

Model	Transmitter Type (Select One)	PD	PG
3051PD	Model 3051P *Reference Class* Differential Pressure Transmitter	•	—
3051PG	Model 3051P *Reference Class* Gage Pressure Transmitter	—	•
Code	**Pressure Ranges (Select One)**	**PD**	**PG**
2	0–25 to 0–250 inH_2O (0–6.2 to 0–62.2 kPa)	•	•
3	0–100 to 0–1,000 inH_2O (0–24.8 to 0–248 kPa)	•	•
4	0–30 to 0–300 psi (0–207 to 0–2070 kPa)—Gage Pressure Only	—	•
5	0–200 to 0–2,000 psi (0–1380 to 0–13800 kPa)—Gage Pressure Only	—	•
Code	**Output**	**PD**	**PG**
A	4–20 mA with Digital Signal Based on *HART* Protocol	•	•
	MATERIALS OF CONSTRUCTION		
Code	**Process Flange Type** / **Flange Material** / **Drain/Vent** / **Flange Adapters**	**PD**	**PG**
2	*Coplanar* / SST / SST / SST	•	•
0	Alternate Flange–See Option H2	•	•
Code	**Isolating Diaphragm**	**PD**	**PG**
2	316L SST	•	•
Code	**O-ring**	**PD**	**PG**
A	Glass-filled TFE	•	•
Code	**Fill Fluid**	**PD**	**PG**
1	Silicone	•	•
Code	**Housing Material** / **Conduit Entry Size**	**PD**	**PG**
A	Polyurethane-covered Aluminum / ½–14 NPT	•	•
B	Polyurethane-covered Aluminum / M20 x 1.5 (CM20)	•	•
C	Polyurethane-covered Aluminum / PG 13.5	•	•
D	Polyurethane-covered Aluminum / G ½	•	•
J	SST / ½–14 NPT	•	•
K	SST / M20 x 1.5 (CM20)	•	•
L	SST / PG 13.5	•	•
Code	**Options**	**PD**	**PG**
	ALTERNATE FLANGE OPTION (Requires Materials of Construction Code 0)		
H2	Traditional Flange, 316 SST, SST Drain/Vent, SST Flange Adapter	•	•
FA	Level Flange, SST, 2 in., ANSI Class 150, Vertical Mount	•	•
FB	Level Flange, SST, 2 in., ANSI Class 300, Vertical Mount	•	•
FC	Level Flange, SST, 3 in., ANSI Class 150, Vertical Mount	•	•
FD	Level Flange, SST, 3 in., ANSI Class 300, Vertical Mount	•	•
FP	DIN Level Flange, SST, DN 50, PN 40, Vertical Mount	•	•
FQ	DIN Level Flange, SST, DN 80, PN 40, Vertical Mount	•	•
	INTEGRAL MOUNT MANIFOLD		
S5	Assemble to Model 305 Integral Manifold (Refer to PPL 00814-0100-4733 for Pricing Information)	•	•
	INTEGRAL MOUNT PRIMARY ELEMENTS		
S4(1)	Factory Assembly to Rosemount Primary Element (Model 1295 Annubar or Model 1195 Integral Orifice)	•	•
	MOUNTING BRACKETS		
B4	*Coplanar* Flange Bracket for 2-in. Pipe or Panel Mounting, All SST	•	•
B1	Traditional Flange Bracket for 2-in. Pipe Mounting, CS Bolts	•	•
B2	Traditional Flange Bracket for Panel Mounting, CS Bolts	•	•
B7	B1 Bracket with Series 300 SST Bolts	•	•
B8	B2 Bracket with Series 300 SST Bolts	•	•
	HAZARDOUS LOCATIONS CERTIFICATIONS		
E5	FM Explosion-Proof Approval	•	•
I5	FM Non-incendive and Intrinsic Safety Approval	•	•
K5	FM Explosion-Proof and Intrinsic Safety Approval	•	•
C6	CSA Explosion-Proof and Intrinsic Safety Approval (Requires 42.4 V dc max. power supply)	•	•
K6	Combination of CSA and CENELEC Explosion-Proof and Intrinsic Safety Approval	•	•
I1	BASEEFA/CENELEC Intrinsic Safety Certification	•	•
N1	BASEEFA Type N Certification	•	•
E8	CESI/CENELEC Flameproof Certification	•	•
E4	JIS Flameproof Certification	•	•
E7	SAA Flameproof Certification	•	•
I7	SAA Intrinsic Safety Certification	•	•
N7	SAA Type N Certification	•	•

(1) With the primary element installed, the maximum operating pressure will equal the lesser of either the transmitter or the primary element. Option is available for factory assembly to range 1–4 transmitters only.

TABLE 5-10. (continued).

Code	Options (continued)	PD	PG
	OTHER OPTIONS		
Q4	Calibration Data Sheet	•	•
Q8[1]	Material Traceability Certification per EN 10204 3.1B	•	•
L4	Austenitic 316 SST bolts	•	•
L5	ANSI/ASTM-A-193-B7M Bolts	•	•
L6	*Monel* Bolts	•	•
P1	Hydrostatic Testing	•	•
P2	Cleaning for Special Service	•	•
P3	Cleaning for <1 PPM Chlorine/Fluorine	•	•
D3	¼–18 NPT Process Connections (No flange adapters)	•	•
D7	*Coplanar* Flange Without Drain/Vent Ports	•	•
J1[2]	Local Zero Adjustment Only	•	•
J3[2]	No Local Zero or Span Adjustment	•	•
M5	LCD Meter for Aluminum Housing (Housing Codes A, B, C, and D only)	•	•
M6	LCD Meter for SST Housing (Housing Codes J, K, and L only)	•	•
T1[3]	Transient Protection Terminal Block	•	•
C1	Custom Software Configuration (Completed CDS 00806-0100-4001 required with order)	•	•
C4[4]	Analog Output Levels Compliant with NAMUR Recommendation NE43, 18-January-1994	•	•
V5	External Ground Screw Assembly	•	•
Typical Model Number:	**3051PD 3 A 2 2 A 1 A B4**		

(1) This option is available for the sensor module housing and Coplanar or traditional flanges and adapters (Model 3051C/P).
(2) Local zero and span adjustments are standard unless Option Code J1 or J3 is specified.
(3) Not available with hazardous locations certification Option Code I1.
(4) NAMUR-Compliant operation is pre-set at the factory and cannot be changed to standard operation in the field.

TABLE 5. Model 3051T Gage and Absolute Pressure Transmitter.

Model	Transmitter Type	
3051T	Pressure Transmitter	
Code	**Pressure Type**	
G	Gage	
A	Absolute	
Code	**PRESSURE RANGES 3051TG**	**3051TA**
1	0–0.3 to 0–30 psig (0–2 to 0–207 kPa)	0–0.3 to 0–30 psia (0–2 to 0–207 kPa)
2	0–1.5 to 0–150 psig (0–10 to 0–1034 kPa)	0–1.5 to 0–150 psia (0–10 to 0–1034 kPa)
3	0–8 to 0–800 psig (0–55 to 0–5516 kPa)	0–8 to 0–800 psia (0–55 to 0–5516 kPa)
4	0–40 to 0–4,000 psig (0–276 to 0–27579 kPa)	0–40 to 0–4,000 psia (0–276 to 0–27579 kPa)
5	0–2,000 to 0–10,000 psig (0–13800 to 0–68900 kPa)	0–2,000 to 0–10,000 psia (0–13800 to 0–68900 kPa)
Code	**Output**	
A	4–20 mA with Digital Signal Based on *HART* Protocol	
M(1)	Low-Power, 1–5 V dc with Digital Signal Based on *HART* Protocol (See Option Code C2 for 0.8–3.2 V dc Output)	
Code	**Process Connection Style**	
2A	¼–18 NPT Female	
2B	½–14 NPT Female	
2C	G½ A DIN 16288 Male (Available in SST for Range 1–4 Only)	
2F	Coned and Threaded, Compatible with Autoclave Type F-250-C (Includes Gland and Collar, Available in SST for Range 5 Only)	
Code	**Isolating Diaphragm**	**Process Connection Wetted Parts Material**
2(2)	316L SST	316L SST
3(2)	*Hastelloy*	*Hastelloy*
Code	**Fill Fluid**	
1	Silicone	
2	Inert	
Code	**Housing Material**	**Conduit Entry Size**
A	Polyurethane-covered Aluminum	½–14 NPT
B	Polyurethane-covered Aluminum	M20 x 1.5 (CM20)
C	Polyurethane-covered Aluminum	PG 13.5
D	Polyurethane-covered Aluminum	G½
J	SST	½–14 NPT
K	SST	M20 x 1.5 (CM20)
L	SST	PG 13.5
Code	**Options**	
	INTEGRAL MOUNT MANIFOLD	
S5	Assemble to Model 306 Integral Manifold (Requires ½ inch process connection code 2B – Refer to PPL 00814-0100-4733 for Pricing Information)	
	REMOTE DIAPHRAGM SEAL ASSEMBLIES	
S1	One Remote Diaphragm Seal (Direct Mount or Capillary Connection Type)	
	MOUNTING BRACKETS	
B4	Bracket for 2-in. Pipe or Panel Mounting, All SST	
	HAZARDOUS LOCATIONS CERTIFICATIONS	
E5	FM Explosion-Proof Approval	
I5	FM Non-incendive and Intrinsic Safety Approval	
K5	FM Explosion-Proof and Intrinsic Safety Approval	
C6	CSA Explosion-Proof and Intrinsic Safety Approval (requires 42.4 V dc max. power supply)	
K6(3)	Combination of CSA and CENELEC Explosion-proof and Intrinsic Safety Approval	
I1	BASEEFA/CENELEC Intrinsic Safety Certification	
N1	BASEEFA Type N Certification	
E8	CESI/CENELEC Flameproof Certification	
	OTHER OPTIONS	
Q4	Calibration Data Sheet	
Q8(4)	Material Traceability Certification per EN 10204 3.1B	
J1(5)	Local Zero Adjustment Only	
J3(5)	No Local Zero or Span Adjustment	
M5	LCD Meter for Aluminum Housing (Housing Codes A, B, C, and D only)	
M6	LCD Meter for SST Housing (Housing Codes J, K, and L only)	
T1(6)	Transient Protection Terminal Block	
C1	Custom Software Configuration (Completed CDS 00806-0100-4001 required with order)	
C2	0.8–3.2 V dc Output with Digital Signal Based on *HART* Protocol (Output Code M only)	
C4(7)	Analog Output Levels Compliant with NAMUR Recommendation NE43, 18-January-1994	
P1	Hydrostatic Testing	
P2	Cleaning for Special Service	
P3	Cleaning for <1 PPM Chlorine/Fluorine	
V5	External Ground Screw Assembly	
Typical Model Number:	**3051T G 5 A 2A 2 1 A B4**	

(1) Not available with hazardous locations certification Option Codes I1 or N1.
(2) Meets NACE requirements per MR 01-75.
(3) Not available with low-power Option Code M.
(4) This option is available for the Model 3051T process connection only.
(5) Local zero and span adjustments are standard unless Option Code J1 or J3 is specified.
(6) Not available with hazardous locations certification Option Code I1.
(7) NAMUR-Compliant operation is pre-set at the factory and cannot be changed to standard operation in the field.

GENERAL ORDERING INFORMATION

Standard Configuration

Unless otherwise specified, transmitter is shipped as follows:

Engineering units:

- Differential/Gage — inH_2O (Range 1, 2, and 3); psi (Range 4 and 5)
- Absolute/3051T — psi (all ranges)

4 mA (1 V dc):	0 (engineering units above)
20 mA (5 V dc):	Upper range limit
Output:	Linear
Flange type:	Specified model code option
Flange material:	Specified model code option
O-ring material:	Specified model code option
Drain/vent:	Specified model code option
Integral meter:	Installed or none
Alarm:	Upscale
Software tag:	(Blank)

Customer may specify the above items at no charge.

Custom Configuration (Option Code C1)

If Option Code C1 is ordered, the customer may specify the following data in addition to the standard configuration parameters.

Descriptor, Message, Date, Damping, Custom Meter Display(1), Local Zero and Span Control, Alarm Jumper Setting, Write Protect Jumper Setting, Burst Mode Configuration, Multidrop Configuration.

Refer to Configuration Data Sheet 00806-0100-4001.

Tagging

Three customer tagging options are available:

1. Standard SST tag is wired to the transmitter. Tag character height is 0.125 in. (3.18 mm), 85 characters maximum.
2. Tag may be permanently stamped on transmitter nameplate upon request, 65 characters maximum.
3. Tag may be stored in transmitter memory. Software tag (8 characters maximum) is left blank unless specified.

Optional Model 305 Integral Manifolds

Factory assembled to Coplanar Model 3051 transmitters. Refer to PDS 00813-0100-4733 for ordering information.

Optional Three-Valve Conventional Manifolds

(Packaged Separately).

Part No. 01151-0150-0001
3-Valve Manifold, Carbon Steel
(Anderson, Greenwood & Co., M4AVIC).

Part No. 01151-0150-0002
3-Valve Manifold, 316 SST
(Anderson, Greenwood & Co., M4AVIS).

Output Information

Analog output range points must be the same unit of measure. Available units of measure:

inH_2O	mbar	mmHg	kPa
inHg	g/cm^2	psi	torr
ftH_2O	kg/cm^2	bar	atm
mmH_2O	Pa	inH_2O @ 4 °C(1)	mmH_2O @ 4 °C(1)

(1) Not available on low power or previous versions.

PARTS LIST

Item numbers are references to figure callouts (pages 5-35–5-39).

Model 3051C Differential, Gage, and Absolute Transmitters

Item No.	Model 3051C SENSOR MODULES Part Description	Silicone Fill Part Number		Inert Fill Part Number	
8	**Differential Sensor Module**(1)				
	0–0.5/25 inH2O, Range 1				
	316L SST	03031-1045-0012	•	03031-1145-0012	•
	Hastelloy C-276	03031-1045-0013	•	03031-1145-0013	•
	Monel	03031-1045-0014	•	03031-1145-0014	•
	Gold-plated Monel	03031-1045-0016	•	03031-1145-0016	•
	0–2.5/250 inH2O, Range 2				
	316L SST	03031-1045-0022	•	03031-1145-0022	•
	Hastelloy C-276	03031-1045-0023	•	03031-1145-0023	•
	Monel	03031-1045-0024	•	03031-1145-0024	•
	Tantalum	03031-1045-0025	•	03031-1145-0025	•
	Gold-plated *Monel*	03031-1045-0026	•	03031-1145-0026	•
	0–10/1,000 inH_2O, Range 3				
	316L SST	03031-1045-0032	•	03031-1145-0032	•
	Hastelloy C-276	03031-1045-0033	•	03031-1145-0033	•
	Monel	03031-1045-0034	•	03031-1145-0034	•
	Tantalum	03031-1045-0035	•	03031-1145-0035	•
	Gold-plated *Monel*	03031-1045-0036	•	03031-1145-0036	•
	0–3/300 psi, Range 4				
	316L SST	03031-1045-2042	•	03031-1145-2042	•
	Hastelloy C-276	03031-1045-2043	•	03031-1145-2043	•
	Monel	03031-1045-2044	•	03031-1145-2044	•
	Tantalum	03031-1045-2045	•	03031-1145-2045	•
	Gold-plated *Monel*	03031-1045-2046	•	03031-1145-2046	•
	0–20/2,000 psi, Range 5				
	316L SST	03031-1045-2052	•	03031-1145-2052	•
	Hastelloy C-276	03031-1045-2053	•	03031-1145-2053	•
	Monel	03031-1045-2054	•	03031-1145-2054	•
	Tantalum	03031-1045-2055	•	03031-1145-2055	•
	Gold-plated *Monel*	03031-1045-2056	•	03031-1145-2056	•
8	**Gage Sensor Module**(1)				
	0–2.5/250 inH_2O, Range 2				
	316L SST	03031-1045-0022		03031-1145-0022	
	Hastelloy C-276	03031-1045-0023	•	03031-1145-0023	•
	Monel	03031-1045-0024	•	03031-1145-0024	•
	Tantalum	03031-1045-0025	•	03031-1145-0025	•
	Gold-plated *Monel*	03031-1045-0026	•	03031-1145-0026	•
	0–10/1,000 inH_2O, Range 3				
	316L SST	03031-1045-0032	•	03031-1145-0032	•
	Hastelloy C-276	03031-1045-0033	•	03031-1145-0033	•
	Monel	03031-1045-0034	•	03031-1145-0034	•
	Tantalum	03031-1045-0035	•	03031-1145-0035	•
	Gold-plated *Monel*	03031-1045-0036	•	03031-1145-0036	•
	0–3/300 psi, Range 4				
	316L SST	03031-1045-1042	•	03031-1145-1042	•
	Hastelloy C-276	03031-1045-1043	•	03031-1145-1043	•
	Monel	03031-1045-1044	•	03031-1145-1044	•
	Tantalum	03031-1045-1045	•	03031-1145-1045	•
	Gold-plated *Monel*	03031-1045-1046	•	03031-1145-1046	•
	0–20/2,000 psi, Range 5				
	316L SST	03031-1045-1052	•	03031-1145-1052	•
	Hastelloy C-276	03031-1045-1053	•	03031-1145-1053	•
	Monel	03031-1045-1054	•	03031-1145-1054	•
	Tantalum	03031-1045-1055	•	03031-1145-1055	•
	Gold-plated *Monel*	03031-1045-1056	•	03031-1145-1056	•

(1) One spare part is recommended for every 50 transmitters.

Model 3051C Differential, Gage, and Absolute Transmitters

Item No.	Model 3051C SENSOR MODULES (continued) Part Description	Silicone Fill Part Number		Inert Fill Part Number	
8	**Absolute Sensor Module**[1]				
	0–0.167/5 psia, Range 0				
	316L SST	03031-2020-0002	•	—	—
	Hastelloy C-276	03031-2020-0003	•	—	—
	Monel	03031-2020-0004	•	—	—
	0–0.3/30 psia, Range 1				
	316L SST	03031-2020-0012	•	—	—
	Hastelloy C-276	03031-2020-0013	•	—	—
	Monel	03031-2020-0014	•	—	—
	0–1.5/150 psia, Range 2				
	316L SST	03031-2020-0022	•	—	—
	Hastelloy C-276	03031-2020-0023	•	—	—
	Monel	03031-2020-0024	•	—	—
	0–8/800 psia, Range 3				
	316L SST	03031-2020-0032	•	—	—
	Hastelloy C-276	03031-2020-0033	•	—	—
	Monel	03031-2020-0034	•	—	—
	0–40/4000 psia, Range 4				
	316L SST	03031-2020-0042	•	—	—
	Hastelloy C-276	03031-2020-0043	•	—	—
	Monel	03031-2020-0044	•	—	—

(1) One spare part is recommended for every 50 transmitters.

Model 3051T Gage and Absolute Pressure Transmitters

Item No.	Model 3051T SENSOR MODULES[1] Part Description	Isolating Diaphragm	Housing Material	Silicone Fill Part Number	Inert Fill Part Number
34	**Gage Sensor Module[2]**				
	0–40/4,000 psig, Range 4				
	¼–18 NPT Female	316L SST	Aluminum	03031-3112-3142	03031-3112-1142
	¼–18 NPT Female	*Hastelloy C*	Aluminum	03031-3112-3143	03031-3112-1143
	½–14 NPT Female	316L SST	Aluminum	03031-3102-3142	03031-3102-1142
	½–14 NPT Female	*Hastelloy C*	Aluminum	03031-3102-3143	03031-3102-1143
	G½A DIN 16288 Male	316L SST	Aluminum	03031-3132-3142	03031-3132-1142
	¼–18 NPT Female	316L SST	SST	03031-3111-3142	03031-3111-1142
	¼–18 NPT Female	*Hastelloy C*	SST	03031-3111-3143	03031-3111-1143
	½–14 NPT Female	316L SST	SST	03031-3101-3142	03031-3101-1142
	½–14 NPT Female	*Hastelloy C*	SST	03031-3101-3143	03031-3101-1143
34	**Gage Sensor Module[2]**				
	0–8/800 psig, Range 3				
	¼–18 NPT Female	316L SST	Aluminum	03031-3112-3132	03031-3112-1132
	¼–18 NPT Female	*Hastelloy C*	Aluminum	03031-3112-3133	03031-3112-1133
	½–14 NPT Female	316L SST	Aluminum	03031-3102-3132	03031-3102-1132
	½–14 NPT Female	*Hastelloy C*	Aluminum	03031-3102-3133	03031-3102-1133
	G½A DIN 16288 Male	316L SST	Aluminum	03031-3132-3132	03031-3132-1132
	¼–18 NPT Female	316L SST	SST	03031-3111-3132	03031-3111-1132
	¼–18 NPT Female	*Hastelloy C*	SST	03031-3111-3133	03031-3111-1133
	½–14 NPT Female	316L SST	SST	03031-3101-3132	03031-3101-1132
	½–14 NPT Female	*Hastelloy C*	SST	03031-3101-3133	03031-3101-1133
34	**Gage Sensor Module[2]**				
	0–1.5/150 psig, Range 2				
	¼–18 NPT Female	316L SST	Aluminum	03031-3112-3122	03031-3112-1122
	¼–18 NPT Female	*Hastelloy C*	Aluminum	03031-3112-3123	03031-3112-1123
	½–14 NPT Female	316L SST	Aluminum	03031-3102-3122	03031-3102-1122
	½–14 NPT Female	*Hastelloy C*	Aluminum	03031-3102-3123	03031-3102-1123
	G½A DIN 16288 Male	316L SST	Aluminum	03031-3132-3122	03031-3132-1122
	¼–18 NPT Female	316L SST	SST	03031-3111-3122	03031-3111-1122
	¼–18 NPT Female	*Hastelloy C*	SST	03031-3111-3123	03031-3111-1123
	½–14 NPT Female	316L SST	SST	03031-3101-3122	03031-3101-1122
	½–14 NPT Female	*Hastelloy C*	SST	03031-3101-3123	03031-3101-1123
34	**Gage Sensor Module[2]**				
	0–0.3/30 psig, Range 1				
	¼–18 NPT Female	316L SST	Aluminum	03031-3112-3112	03031-3112-1112
	¼–18 NPT Female	*Hastelloy C*	Aluminum	03031-3112-3113	03031-3112-1113
	½–14 NPT Female	316L SST	Aluminum	03031-3102-3112	03031-3102-1112
	½–14 NPT Female	*Hastelloy C*	Aluminum	03031-3102-3113	03031-3102-1113
	G½A DIN 16288 Male	316L SST	Aluminum	03031-3132-3112	03031-3132-1112
	¼–18 NPT Female	316L SST	SST	03031-3111-3112	03031-3111-1112
	¼–18 NPT Female	*Hastelloy C*	SST	03031-3111-3113	03031-3111-1113
	½–14 NPT Female	316L SST	SST	03031-3101-3112	03031-3101-1112
	½–14 NPT Female	*Hastelloy C*	SST	03031-3101-3113	03031-3101-1113
34	**Absolute Sensor Module[2]**				
	0–2,000/10,000 psig, Range 5				
	¼–18 NPT Female	316L SST	Aluminum	03031-3112-3052	03031-3112-1052
	¼–18 NPT Female	*Hastelloy C*	Aluminum	03031-3112-3053	03031-3112-1053
	½–14 NPT Female	316L SST	Aluminum	03031-3102-3052	03031-3102-1052
	½–14 NPT Female	*Hastelloy C*	Aluminum	03031-3102-3053	03031-3102-1053
	Autoclave type F-250-C	316L SST	Aluminum	03031-3122-3052	03031-3122-1052
	¼–18 NPT Female	316L SST	SST	03031-3111-3052	03031-3111-1052
	¼–18 NPT Female	*Hastelloy C*	SST	03031-3111-3053	03031-3111-1053
	½–14 NPT Female	316L SST	SST	03031-3101-3052	03031-3101-1052
	½–14 NPT Female	*Hastelloy C*	SST	03031-3101-3053	03031-3101-1053
	Autoclave type F-250-C	316L SST	SST	03031-3121-3052	03031-3121-1052

Model 3051T Gage and Absolute Pressure Transmitters

Item No.	Model 3051T SENSOR MODULES Part Description	Isolating Diaphragm	Housing Material	Silicone Fill	Inert Fill
				Part Number	Part Number
34	**Absolute Sensor Module**[1]				
	0–40/4,000 psig, Range 4				
	¼–18 NPT Female	316L SST	Aluminum	03031-3112-3042	03031-3112-1042
	¼–18 NPT Female	*Hastelloy C*	Aluminum	03031-3112-3043	03031-3112-1043
	½–14 NPT Female	316L SST	Aluminum	03031-3102-3042	03031-3102-1042
	½–14 NPT Female	*Hastelloy C*	Aluminum	03031-3102-3043	03031-3102-1043
	G½A DIN 16288 Male	316L SST	Aluminum	03031-3132-3042	03031-3132-1042
	¼–18 NPT Female	316L SST	SST	03031-3111-3042	03031-3111-1042
	¼–18 NPT Female	*Hastelloy C*	SST	03031-3111-3043	03031-3111-1043
	½–14 NPT Female	316L SST	SST	03031-3101-3042	03031-3101-1042
	½–14 NPT Female	*Hastelloy C*	SST	03031-3101-3043	03031-3101-1043
34	**Absolute Sensor Module**[1]				
	0–8/800 psig, Range 3				
	¼–18 NPT Female	316L SST	Aluminum	03031-3112-3032	03031-3112-1032
	¼–18 NPT Female	*Hastelloy C*	Aluminum	03031-3112-3033	03031-3112-1033
	½–14 NPT Female	316L SST	Aluminum	03031-3102-3032	03031-3102-1032
	½–14 NPT Female	*Hastelloy C*	Aluminum	03031-3102-3033	03031-3102-1033
	G½A DIN 16288 Male	316L SST	Aluminum	03031-3132-3032	03031-3132-1032
	¼–18 NPT Female	316L SST	SST	03031-3111-3032	03031-3111-1032
	¼–18 NPT Female	*Hastelloy C*	SST	03031-3111-3033	03031-3111-1033
	½–14 NPT Female	316L SST	SST	03031-3101-3032	03031-3101-1032
	½–14 NPT Female	*Hastelloy C*	SST	03031-3101-3033	03031-3101-1033
34	**Absolute Sensor Module**[1]				
	0–1.5/150 psig, Range 2				
	¼–18 NPT Female	316L SST	Aluminum	03031-3112-3022	03031-3112-1022
	¼–18 NPT Female	*Hastelloy C*	Aluminum	03031-3112-3023	03031-3112-1023
	½–14 NPT Female	316L SST	Aluminum	03031-3102-3022	03031-3102-1022
	½–14 NPT Female	*Hastelloy C*	Aluminum	03031-3102-3023	03031-3102-1023
	G½A DIN 16288 Male	316L SST	Aluminum	03031-3132-3022	03031-3132-1022
	¼–18 NPT Female	316L SST	SST	03031-3111-3022	03031-3111-1022
	¼–18 NPT Female	*Hastelloy C*	SST	03031-3111-3023	03031-3111-1023
	½–14 NPT Female	316L SST	SST	03031-3101-3022	03031-3101-1022
	½–14 NPT Female	*Hastelloy C*	SST	03031-3101-3023	03031-3101-1023
34	**Absolute Sensor Module**[1]				
	0–0.3/30 psig, Range 1				
	¼–18 NPT Female	316L SST	Aluminum	03031-3112-3012	03031-3112-1012
	¼–18 NPT Female	*Hastelloy C*	Aluminum	03031-3112-3013	03031-3112-1013
	½–14 NPT Female	316L SST	Aluminum	03031-3102-3012	03031-3102-1012
	½–14 NPT Female	*Hastelloy C*	Aluminum	03031-3102-3013	03031-3102-1013
	G½A DIN 16288 Male	316L SST	Aluminum	03031-3132-3012	03031-3132-1012
	¼–18 NPT Female	316L SST	SST	03031-3111-3012	03031-3111-1012
	¼–18 NPT Female	*Hastelloy C*	SST	03031-3111-3013	03031-3111-1013
	½–14 NPT Female	316L SST	SST	03031-3101-3012	03031-3101-1012
	½–14 NPT Female	*Hastelloy C*	SST	03031-3101-3013	03031-3101-1053

(1) For Model 3051TG Range 5 spare module, order absolute configuration and perform zero trim for gage calibrations.
(2) One spare part is recommended for every 50 transmitters.

Before you Order a Replacement Housing, Terminal Block, or LCD Meter

Replacement parts differ between improved and previous style transmitter housings. Verify the specific physical characteristics of your transmitter before you order parts. The width of the conduit entries is the most noticeable physical difference between versions (see Figure 5-1).

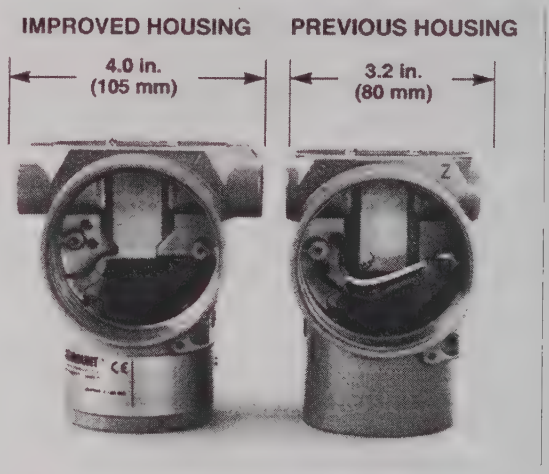


FIGURE 5-1. Improved and Previous Styles of the Model 3051 Transmitter Housing.

Model 3051 Differential, Gage, Absolute, and Liquid Level Transmitters

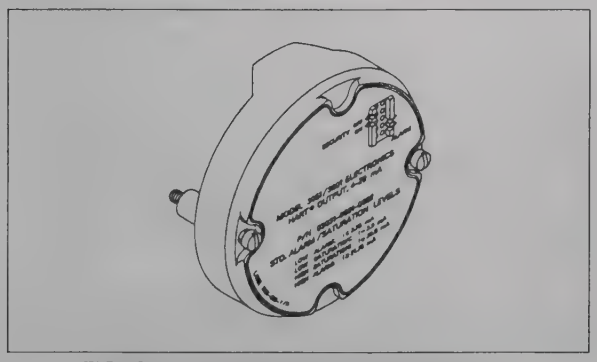
Item No.	ELECTRONICS BOARD ASSEMBLY HARDWARE Part Description	Part Number	Model					
			CD	CG	CA	L	H	T
6	*Improved* Standard (4–20 mA/HART protocol)(1) (See Figure 5-2)	03031-0001-0002	•	•	•	•	•	•
6	*Previous* Standard (4–20 mA/HART protocol)(1) (See Figure 5-3)	03031-0001-0001	•	•	•	•	•	•
6	*Improved* NAMUR Compliant (4–20 mA/HART protocol)(1) (See Figure 5-2)	03031-0001-0003	•	•	•	•	•	•
6	Low Power (1–5/0.8–3.2 Volts)(1)	03031-0001-1001	•	•	•	•	•	•
Item No.	HOUSING, COVERS, TERMINAL BLOCKS Part Description	Part Number	Model					
			CD	CG	CA	L	H	T
	***Improved* Standard (4–20 mA) Aluminum Housing**							
4	Electronics Housing without Terminal Block							
	½–14 NPT conduit, Includes RFI Filters	03031-0635-0001	•	•	•	•	•	•
	M20 x 1.5 (CM20) conduit, includes RFI filters	03031-0635-0002	•	•	•	•	•	•
	PG 13.5 conduit, Includes RFI Filters	03031-0635-0003	•	•	•	•	•	•
	G½ conduit, Includes RFI Filters	03031-0635-0004	•	•	•	•	•	•
1	Electronics Cover (Includes wiring label)(2)	03031-0292-0001	•	•	•	•	•	•
3	Standard Terminal Block Assembly(1)	03031-0332-0003	•	•	•	•	•	•
3	Transient Terminal Block Assy. (Option T1)(2)	03031-0332-0004	•	•	•	•	•	•
5	Local Zero and Span Kit(1)	03031-0293-0002	•	•	•	•	•	•
	External Ground Assembly (Option V5)(1)	03031-0398-0001	•	•	•	•	•	•
	***Improved* Standard (4–20 mA) 316 SST Housing**							
4	Electronics Housing without Terminal Block							
	½–14 NPT conduit, Includes RFI Filters	03031-0635-0041	•	•	•	•	•	•
	M20 x 1.5 (CM20) conduit, Includes RFI Filters	03031-0635-0042	•	•	•	•	•	•
	PG 13.5 conduit, Includes RFI Filters	03031-0635-0043	•	•	•	•	•	•
1	Electronics Cover (Includes wiring label)(2)	03031-0292-0002	•	•	•	•	•	•
3	Standard Terminal Block Assembly(1)	03031-0332-0003	•	•	•	•	•	•
3	Transient Terminal Block Assy. (Option T1)(2)	03031-0332-0004	•	•	•	•	•	•
5	Local Zero and Span Kit(1)	03031-0293-0002	•	•	•	•	•	•
	External Ground Assembly (Option V5)(1)	03031-0398-0001	•	•	•	•	•	•

Model 3051 Differential, Gage, Absolute, and Liquid Level Transmitters

Item No.	HOUSING, COVERS, TERMINAL BLOCKS Part Description	Part Number	Model					
			CD	CG	CA	L	H	T
	***Previous* Standard (4–20 mA) Aluminum Housing**							
4	Electronics Housing without Terminal Block							
	½–14 NPT conduit, Includes RFI Filters	03031-0291-0001	•	•	•	•	•	•
	M20 x 1.5 (CM20) conduit, Includes RFI Filters	03031-0291-0003	•	•	•	•	•	•
	PG 13.5 conduit, Includes RFI Filters	03031-0291-0004	•	•	•	•	•	•
	G½ conduit, Includes RFI Filters	03031-0291-0005	•	•	•	•	•	•
1	Electronics Cover (Includes wiring label)(2)	03031-0292-0001	•	•	•	•	•	•
3	Standard Terminal Block Assembly(1)	03031-0332-0001	•	•	•	•	•	•
3	Transient Terminal Block Assy. (Option T1)(2)	03031-0332-0002	•	•	•	•	•	•
5	Local Zero and Span Kit(1)	03031-0293-0001	•	•	•	•	•	•
	External Ground Assembly (Option V5)(1)	03031-0398-0001	•	•	•	•	•	•
	***Previous* Standard (4–20 mA) 316 SST Housing**							
4	Electronics Housing without Terminal Block							
	½–14 NPT conduit, Includes RFI Filters	03031-0291-0011	•	•	•	•	•	•
	M20 x 1.5 (CM20) conduit, Includes RFI Filters	03031-0291-0012	•	•	•	•	•	•
	PG 13.5 conduit, Includes RFI Filters	03031-0291-0013	•	•	•	•	•	•
	Electronics Cover (Includes wiring label)(2)	03031-0292-0002	•	•	•	•	•	•
1	Standard Terminal Block Assembly(1)	03031-0332-0001	•	•	•	•	•	•
3	Transient Terminal Block Assy. (Option T1)(2)	03031-0332-0002	•	•	•	•	•	•
3	Local Zero and Span Kit(1)	03031-0293-0001	•	•	•	•	•	•
5	External Ground Assembly (Option V5)(1)	03031-0398-0001	•	•	•	•	•	•
	***Improved* Low Power Aluminum Housing**							
4	Electronics Housing without Terminal Block							
	½–14 NPT conduit, Includes RFI Filters	03031-0635-0101	•	•	•	•	•	•
1	Electronics Cover (Includes wiring label)(2)	03031-0292-0001	•	•	•	•	•	•
3	Low Power Terminal Block Assembly(1)	03031-0332-1001	•	•	•	•	•	•
3	Low Power Transient Terminal Block Assy. (Option T1)(2)	03031-0332-1002	•	•	•	•	•	•
5	Local Zero and Span Kit(1)	03031-0293-0002	•	•	•	•	•	•
	External Ground Assembly (Option V5)(1)	03031-0398-0001	•	•	•	•	•	•
	***Improved* Low Power 316 SST Housing**							
4	Electronics Housing without Terminal Block							
	½–14 NPT conduit, Includes RFI Filters	03031-0635-0141	•	•	•	•	•	•
1	Electronics Cover (Includes wiring label)(2)	03031-0292-0002	•	•	•	•	•	•
3	Low Power Terminal Block Assembly(1)	03031-0332-1001	•	•	•	•	•	•
3	Low Power Transient Terminal Block Assy. (Option T1)(2)	03031-0332-1002	•	•	•	•	•	•
5	Local Zero and Span Kit(1)	03031-0293-0002	•	•	•	•	•	•
	External Ground Assembly (Option V5)(1)	03031-0398-0001	•	•	•	•	•	•
	***Previous* Low Power Aluminum Housing**							
4	Electronics Housing without Terminal Block							
	½–14 NPT conduit, Includes RFI Filters	03031-0291-0101	•	•	•	•	•	•
1	Electronics Cover (Includes wiring label)(2)	03031-0292-0001	•	•	•	•	•	•
3	Low Power Terminal Block Assembly(1)	03031-0332-1001	•	•	•	•	•	•
3	Low Power Transient Terminal Block Assy. (Option T1)(2)	03031-0332-1002	•	•	•	•	•	•
5	Local Zero and Span Kit(1)	03031-0293-0001	•	•	•	•	•	•
	External Ground Assembly (Option V5)(1)	03031-0398-0001	•	•	•	•	•	•
	***Previous* Low Power 316 SST Housing**							
4	Electronics Housing without Terminal Block							
	½–14 NPT conduit, Includes RFI Filters	03031-0291-0111	•	•	•	•	•	•
1	Electronics Cover (Includes wiring label)(2)	03031-0292-0002	•	•	•	•	•	•
3	Low Power Terminal Block Assembly(1)	03031-0332-1001	•	•	•	•	•	•
3	Low Power Transient Terminal Block Assy. (Option T1)(2)	03031-0332-1002	•	•	•	•	•	•
5	Local Zero and Span Kit(1)	03031-0293-0001	•	•	•	•	•	•
	External Ground Assembly (Option V5)(1)	03031-0398-0001	•	•	•	•	•	•

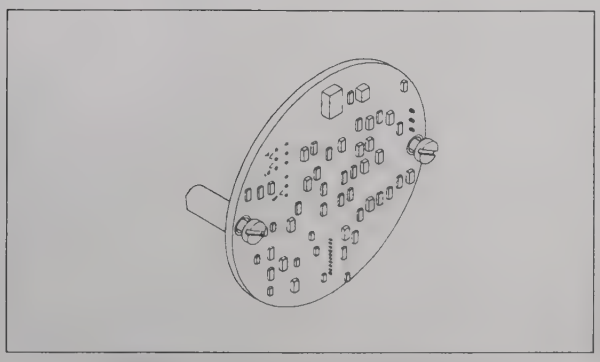
(1) One spare part is recommended for every 25 transmitters.

(2) One spare part is recommended for every 50 transmitters.



3051-3051A

FIGURE 5-2. *Improved* Electronics Board.



3051-3051B

FIGURE 5-3. *Previous* Electronics Board.

Model 3051 Differential, Gage, Absolute, and Liquid Level Transmitters

Item No.	FLANGES Part Description	Part Number	Model					
			CD	CG	CA	L	H	T
	Process Flanges							
11	Differential *Coplanar* Flange (**Figure 5-6**)							
	Nickel-plated Carbon Steel	03031-0388-0025	•	—	—	—	—	—
	316L SST	03031-0388-0022	•	—	—	—	—	—
	Hastelloy C	03031-0388-0023	•	—	—	—	—	—
	Monel	03031-0388-0024	•	—	—	—	—	—
11	Gage/Absolute *Coplanar* Flange (**Figure 5-6**)							
	Nickel-plated Carbon Steel	03031-0388-1025	—	•	•	—	—	—
	316L SST	03031-0388-1022	—	•	•	—	—	—
	Hastelloy C	03031-0388-1023	—	•	•	—	—	—
	Monel	03031-0388-1024	—	•	•	—	—	—
	Coplanar Flange Alignment Screw *(package of 12 screws)*	03031-0309-0001	•	•	•	—	—	—
16	Traditional Flange (**Figure 5-7**)							
	316L SST	03031-0320-0002	•	•	•	—	—	—
	Hastelloy C	03031-0320-0003	•	•	•	—	—	—
	Monel	03031-0320-0004	•	•	•	—	—	—
19	Level Flange, Horizontal Mount (Figure 5-11)							
	3 in., Class 150, SST	03031-0392-0231	•	•	•	—	—	—
	3 in., Class 300, SST	03031-0392-0232	•	•	•	—	—	—
	3 in., Class 150, Carbon Steel	03031-0392-0531	•	•	•	—	—	—
	3 in., Class 300, Carbon Steel	03031-0392-0532	•	•	•	—	—	—
22	Level Flange, Vertical Mount (Figure 5-12)							
	2 in., Class 150, SST	03031-0393-0221	•	•	•	—	—	—
	2 in., Class 300, SST	03031-0393-0222	•	•	•	—	—	—
	3 in., Class 150, SST	03031-0393-0231	•	•	•	—	—	—
	3 in., Class 300, SST	03031-0393-0232	•	•	•	—	—	—
	DIN, DN 40, PN 50	03031-0393-1002	•	•	•	—	—	—
	DIN, DN 40, PN 80	03031-0393-1012	•	•	•	—	—	—
35	3051H Flanges (Figure 5-7)							
	Process Flange	02051-0072-0002	—	—	—	—	•	—
	Blank Flange (GP Low Side)	02051-0236-0002	—	—	—	—	•	—

Item No.	FLANGE ADAPTER UNION Part Description	Part Number	Model					
			CD	CG	CA	L	H	T
15	Nickel-plated Carbon Steel	02024-0068-0005	•	•	•	—	—	—
	316L SST	02024-0069-0002	•	•	•	—	—	—
	Hastelloy C	02024-0069-0003	•	•	•	—	—	—
	Monel	02024-0069-0004	•	•	•	—	—	—

Item No.	DRAIN/VENT VALVE KITS Part Description	Part Number	Model					
			CD	CG	CA	L	H	T
9	**Differential Drain/Vent Kits**[1]							—
	316L SST Valve Stem and Seat Kit	01151-0028-0022	•	—	—	—	•	—
	Hastelloy C Valve Stem and Seat Kit	01151-0028-0023	•	—	—	—	•	—
	Monel Valve Stem and Seat Kit	01151-0028-0024	•	—	—	—	•	—
	316L SST Ceramic Ball Drain/Vent Kit	01151-0028-0122	•	—	—	—	•	—
	Hastelloy C Ceramic Ball Drain/Vent Kit	01151-0028-0123	•	—	—	—	•	—
	Monel Ceramic Ball Drain/Vent Kit	01151-0028-0124	•	—	—	—	•	—
	Gage/Absolute Drain/Vent Kits[1]							
	316L SST Valve Stem and Seat Kit	01151-0028-0012	—	•	•	•	•	—
	Hastelloy C Valve Stem and Seat Kit	01151-0028-0013	—	•	•	•	•	—
	Monel Valve Stem and Seat Kit	01151-0028-0014	—	•	•	•	•	—
	316L SST Ceramic Ball Drain/Vent Kit	01151-0028-0112	—	•	•	•	•	—
	Hastelloy C Ceramic Ball Drain/Vent Kit	01151-0028-0113	—	•	•	•	•	—
	Monel Ceramic Ball Drain/Vent Kit	01151-0028-0114	—	•	•	•	•	—
	(Each kit contains parts for one transmitter.)							

Model 3051 Differential, Gage, Absolute, and Liquid Level Transmitters (continued)

Item No.	O-RING PACKAGES Part Description	Part Number	Model					
			CD	CG	CA	L	H	T
2	Electronic Housing, Cover (Std. and Meter)(1)	03031-0232-0001	•	•	•	•	•	•
7	Electronics Housing, Module(1)	03031-0233-0001	•	•	•	•	•	•
10	Process Flange, Glass-filled *Teflon*(1)	03031-0234-0001	•	•	•	—	—	—
	Process Flange, Graphite-filled *Teflon*	03031-0234-0002	•	•	•	—	—	—
12	Flange Adapter, Glass-filled *Teflon*(1)	03031-0242-0001	•	•	•	—	—	—
	Flange Adapter, Graphite-filled *Teflon*	03031-0242-0002	•	•	•	—	—	—
38	3051H Process Flange, TFE	02051-0167-0001	—	—	—	—	•	—
	(Each package contains 12 O-rings.)							

Item No.	MOUNTING BRACKETS Part Description	Part Number	Model					
			CD	CG	CA	L	H	T
	Coplanar Flange Bracket Kit (Figure 5-13)							
	B4 Bracket, SST, 2-in. Pipe Mount, SST Bolts	03031-0189-0003	•	•	•	—	—	—
	3051T Bracket Kit (Figure 5-13)							
	B4 Bracket, SST, 2-in. Pipe Mount, SST Bolts	03031-0189-0004	—	—	—	—	—	•
	Traditional Flange Bracket Kits (Figure 5-13)							
	B1 Bracket, 2-in. Pipe Mount, CS Bolts	03031-0313-0001	•	•	•	—	—	—
	B2 Bracket, Panel Mount, CS Bolts	03031-0313-0002	•	•	•	—	—	—
	B3 Flat Bracket for 2-in. Pipe Mount, CS Bolts	03031-0313-0003	•	•	•	—	—	—
	B7 (B1 Style Bracket with SST Bolts)	03031-0313-0007	•	•	•	—	—	—
	B8 (B2 Style Bracket with SST Bolts)	03031-0313-0008	•	•	•	—	—	—
	B9 (B3 Style Bracket with SST Bolts)	03031-0313-0009	•	•	•	—	—	—
	BA (SST B1 Bracket with SST Bolts)	03031-0313-0011	•	•	•	—	—	—
	BC (SST B3 Bracket with SST Bolts)	03031-0313-0013	•	•	•	—	—	—
	3051H Bracket Kits (Figure 5-13)							
	B5 Universal Bracket for 2-in. Pipe and Panel Mount, CS Bolts	03051-1081-0001	—	—	—	—	•	—
	B6 Universal Bracket for 2-in. Pipe and Panel Mount, SST Bolts	03051-1081-0002	—	—	—	—	•	—

Item No.	BOLT KITS Part Description	Part Number	Model					
			CD	CG	CA	L	H	T
	***Coplanar* Flange (Figure 5-9)**							
25	Flange Bolt Kit							
	Carbon Steel (set of 4)	03031-0312-0001	•	•	•	—	—	—
	316 SST (set of 4)	03031-0312-0002	•	•	•	—	—	—
	ANSI/ASTM-A-193-B7M	03031-0312-0003	•	•	•	—	—	—
	Monel	03031-0312-0004	•	•	•	—	—	—
26	Flange/Adapter Bolt Kit							
	Carbon Steel (set of 4)	03031-0306-0001	•	•	•	—	—	—
	316 SST (set of 4)	03031-0306-0002	•	•	•	—	—	—
	ANSI/ASTM-A-193-B7M	03031-0306-0003	•	•	•	—	—	—
	Monel	03031-0306-0004	•	•	•	—	—	—
27	Manifold/Flange Kit							
	Carbon Steel (set of 4)	03031-0311-0001	•	—	—	—	—	—
	316 SST (set of 4)	03031-0311-0002	•	—	—	—	—	—
	ANSI/ASTM-A-193-B7M	03031-0311-0003	•	—	—	—	—	—
	Monel	03031-0311-0004	•	—	—	—	—	—
	Traditional Flange (Figure 5-10)							
28	Differential Flange and Adapter Bolt Kit							
	Carbon Steel (set of 8)	03031-0307-0001	•	—	—	—	—	—
	316 SST (set of 8)	03031-0307-0002	•	—	—	—	—	—
	ANSI/ASTM-A-193-B7M	03031-0307-0003	•	—	—	—	—	—
	Monel	03031-0307-0004	•	—	—	—	—	—
	Gage/Absolute Flange and Adapter Bolt Kit							
	Carbon Steel (set of 6)	03031-0307-1001	—	•	•	—	—	—
	316 SST (set of 6)	03031-0307-1002	—	•	•	—	—	—
	ANSI/ASTM-A-193-B7M	03031-0307-1003	—	•	•	—	—	—
	Monel	03031-0307-1004	—	•	•	—	—	—
	Manifold/Traditional Flange Bolts Carbon Steel 316 SST	*Use Bolts Supplied with Anderson Greenwood Manifold*						

Model 3051 Differential, Gage, Absolute, and Liquid Level Transmitters (continued)

Item No.	BOLT KITS Part Description	Part Number	Model					
			CD	CG	CA	L	H	T
	Level Flange, Horizontal Mount (Figure 5-11)							
	Mounting Kit	03031-0308-0001	•	•	•	—	—	—
18	Vented Plug							
20	Mounting Ring							
21	4 Mounting Screws (set of 4)							
	Level Flange, Vertical Mount (Figure 5-12)							
23, 24	Flange Bolt Kit							
	Carbon Steel (set of 4)	03031-0395-0001	•	•	•	—	—	—
	316 SST (set of 4)	03031-0395-0002	•	•	•	—	—	—
	(Each kit contains bolts for one transmitter)							
	3051H Flange (Figure 5-7)							
	Process Flange Bolt Kit, Carbon Steel	02051-0164-0001	—	—	—	—	•	—
36	FlangeBolt (set of 4)							
37	Flange Nut (set of 4)							
	Adapter Bolts (set of 4)							
36	Process Flange Bolt Kit, 316 SST	02051-0164-0002	—	—	—	—	•	—
37	Bolt for Process Flange (set of 4)							
	Nut for Process Flange (set of 4)							
	Adapter Bolts (set of 4)							

Item No.	INDICATING METER OPTION Part Description	Part Number						
			CD	CG	CA	L	H	T
	***Improved* Aluminum Housing (Figure 5-4)**							
	Meter Kit[2]	03031-0193-0101	•	•	•	•	•	•
30	Meter Display							
31	Captive Mounting Hardware							
32	6-pin Interconnection Header							
33	Cover Assembly							
	Meter	03031-0193-0103	•	•	•	•	•	•
30	Meter Display							
31	Captive Mounting Hardware							
32	6-pin Interconnection Header							
	Cover Assembly Kit	03031-0193-0002	•	•	•	•	•	•
	***Improved* 316 SST Housing (Figure 5-4)**							
	Meter Kit[1]	03031-0193-0111	•	•	•	•	•	•
30	Meter Display							
31	Captive Mounting Hardware							
32	6-pin Interconnection Header							
33	Cover Assembly							
	Meter	03031-0193-0103	•	•	•	•	•	•
30	Meter Display							
31	Captive Mounting Hardware							
32	6-pin Interconnection Header							
	Cover Assembly Kit	03031-0193-0012	•	•	•	•	•	•
	***Previous* Aluminum Housing (Figure 5-5)**							
	Meter Kit[1]	03031-0193-0001	•	•	•	•	•	•
	Improved Kit for Previous Aluminum Housing[1]	*03031-0193-1101*	•	•	•	•	•	•
30	Meter Display							
31	Captive Mounting Hardware							
32	6-pin Interconnection Header							
33	Cover Assembly							
	Meter	03031-0193-0003	•	•	•	•	•	•
	Improved Meter for Previous Housing	*03031-0193-1103*	•	•	•	•	•	•
30	Meter Display							
31	Captive Mounting Hardware							
32	6-pin Interconnection Header							
	Cover Assembly Kit	03031-0193-0002	•	•	•	•	•	•
	***Previous* 316 SST Housing (Figure 5-5)**							
	Meter Kit[1]	03031-0193-0011	•	•	•	•	•	•
	Improved Kit for Previous SST Housing[1]	*03031-0193-1111*	•	•	•	•	•	•
30	Meter Display							
31	Captive Mounting Hardware							
32	6-pin Interconnection Header							
33	Cover Assembly							
	Meter	03031-0193-0003	•	•	•	•	•	•
	Improved Meter for Previous Housing	*03031-0193-1103*	•	•	•	•	•	•
30	Meter Display							
31	Captive Mounting Hardware							
32	6-pin Interconnection Header							
	Cover Assembly Kit	03031-0193-0012	•	•	•	•	•	•

(1) One spare part is recommended for every 50 transmitters.

(2) One spare part is recommended for every 25 transmitters.

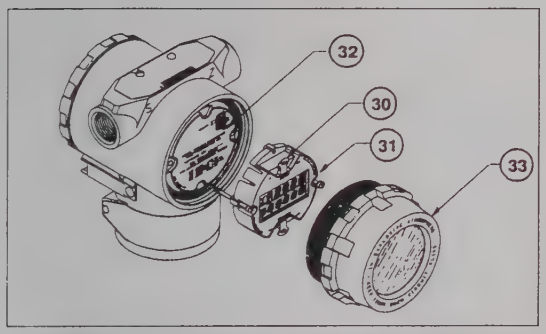


FIGURE 5-4. *Improved* LCD Meter Exploded View.

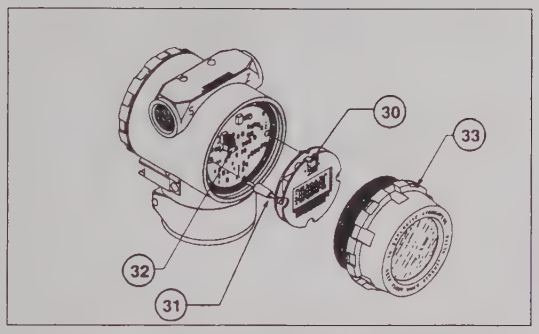


FIGURE 5-5. *Previous* LCD Meter Exploded View.

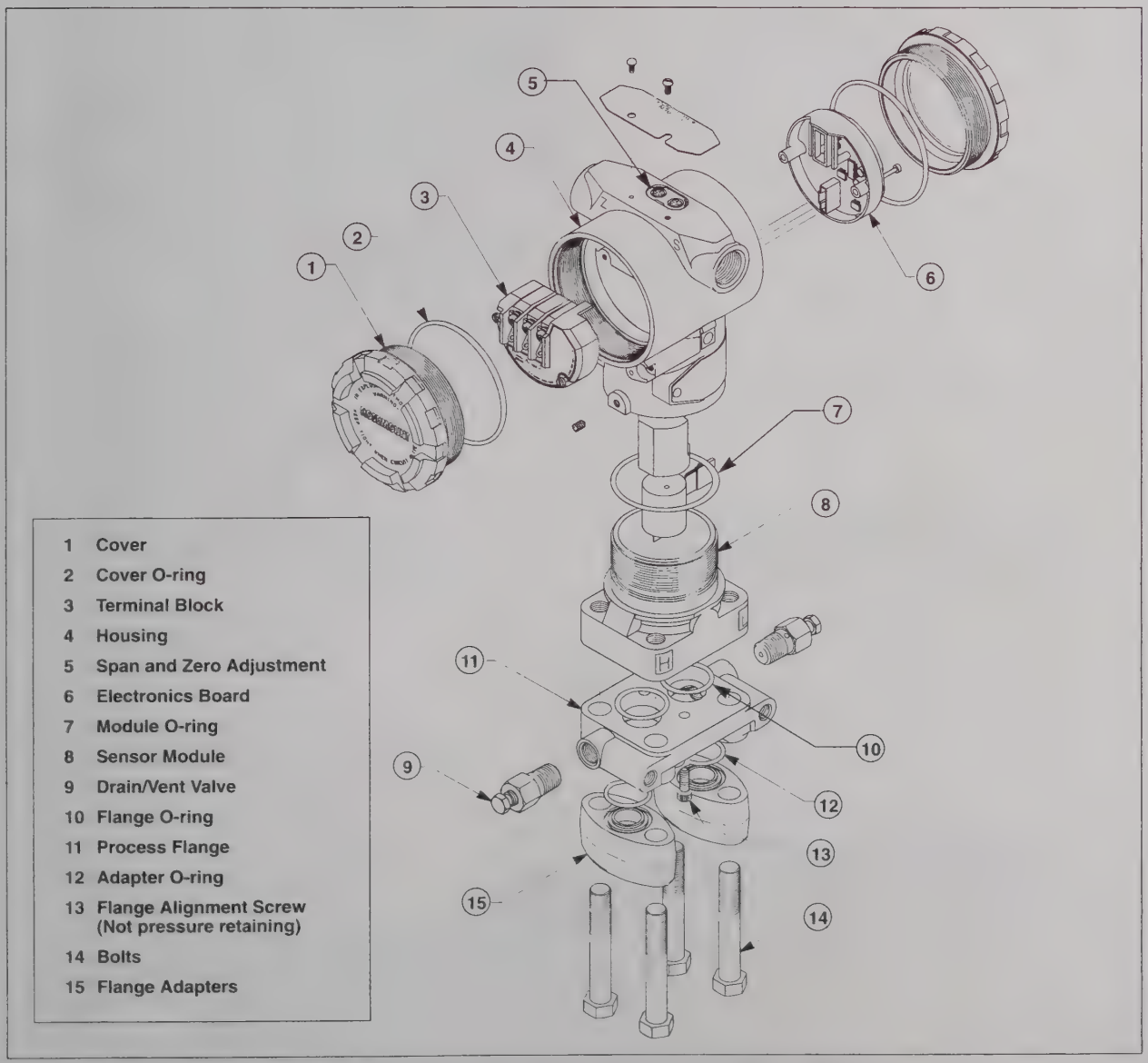


FIGURE 5-6. Model 3051C Exploded View (with Coplanar Flange).

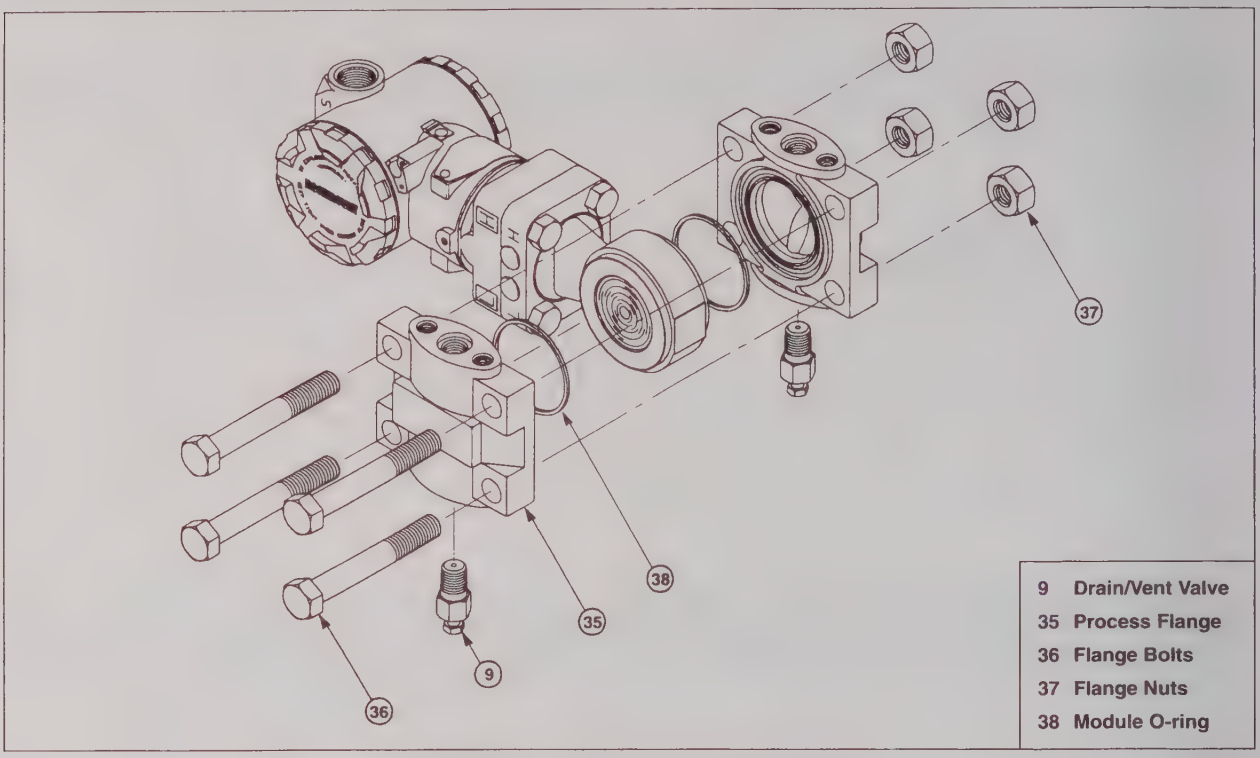


FIGURE 5-7. Model 3051H Exploded View.

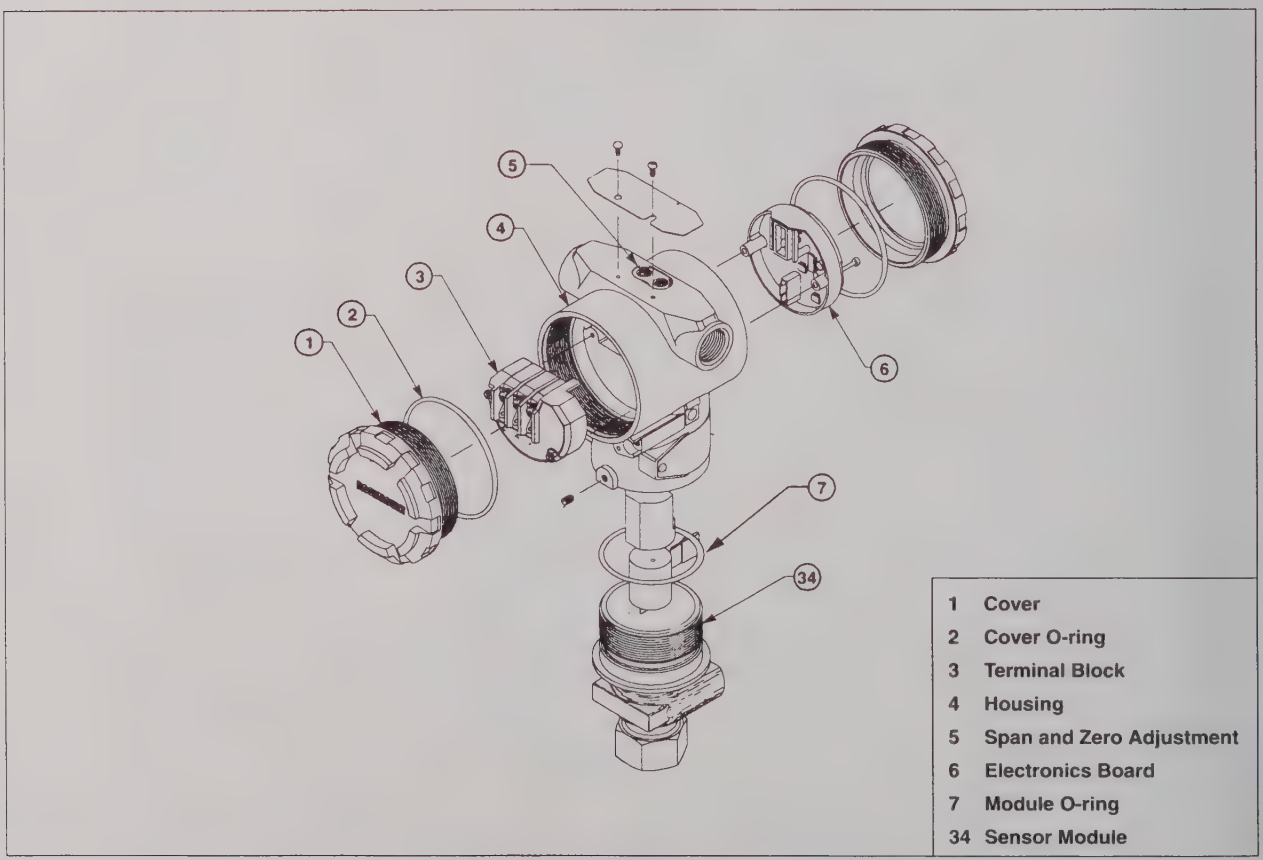
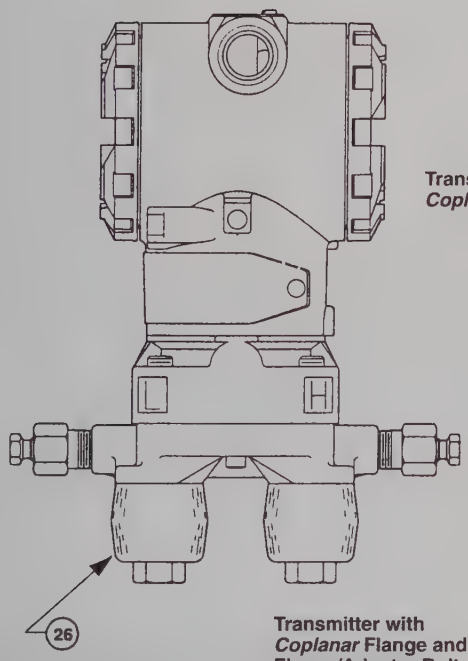
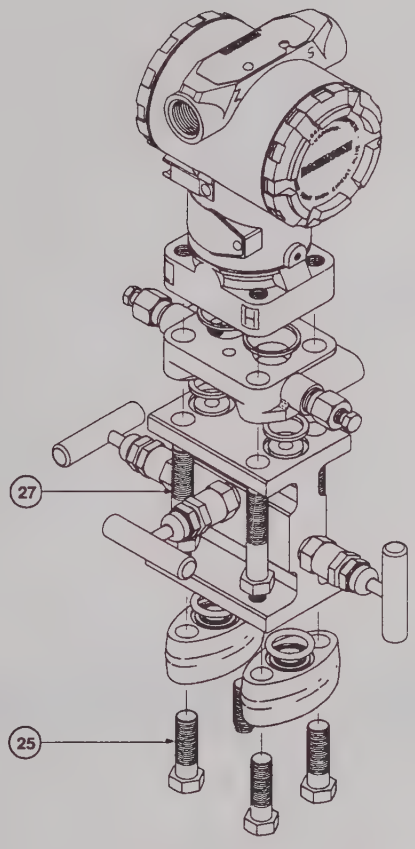


FIGURE 5-8. Model 3051T Exploded View.



Transmitter with *Coplanar* Flange

Transmitter with *Coplanar* Flange and Flange/Adapter Bolts

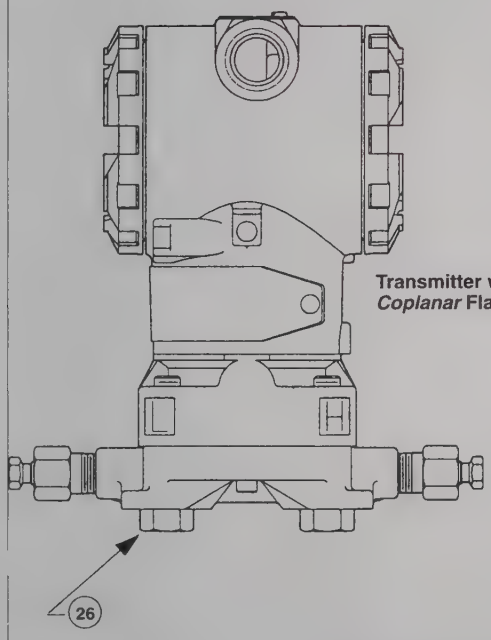


Transmitter with *Coplanar* Flange, 3-Valve Manifold, and Flange Adapters

3051-3031E06D 3051-305-3031A29P

Bolts Required for Assembly (Differential)

Item No.	Description	Qty	Size in.(mm)
25	Flange Bolts	4	1.75 (44)
26	Flange/Adapter Bolts	4	2.88 (73)
27	Manifold/Flange Bolts	4	2.25 (57)



Transmitter with *Coplanar* Flange

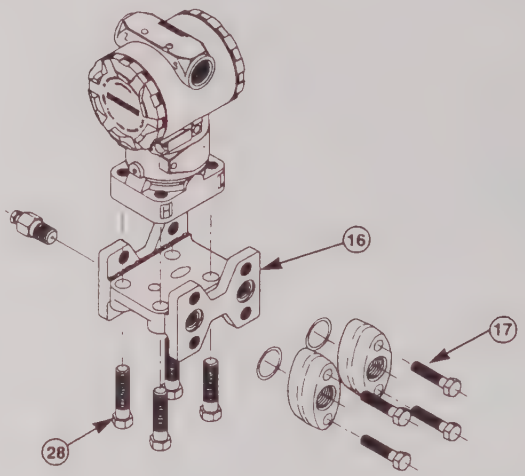
Transmitter with *Coplanar* Flange and Flange/Adapter Bolts

Bolts Required for Assembly (Gage/Absolute)

Item No.	Description	Qty	Size in.(mm)
25	Flange Bolts	4	1.75 (44)
26	Flange/Adapter Bolts	2	2.88 (73)

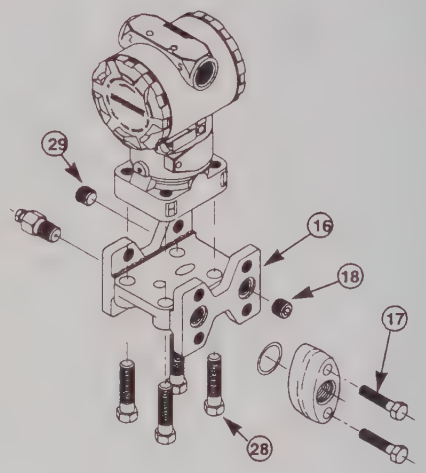
3051-3051E06D

FIGURE 5-9. Bolting Configurations for *Coplanar* Flange (Top–Differential/Bottom–Gage/Absolute).



Bolts Required for Assembly (Differential)

Item No.	Description	Qty	Size in.(mm)
17	Adapter Bolts	4	1.50 (38)
28	Flange Bolts	4	1.75 (44)



Bolts Required for Assembly (Gage/Absolute)

Item No.	Description	Qty	Size in.(mm)
17	Adapter Bolts	2	1.50 (38)
28	Flange Bolts	4	1.75 (44)

3051-305 [illegible] 3051 3051B07F

FIGURE 5-10. Traditional Flange Configuration.

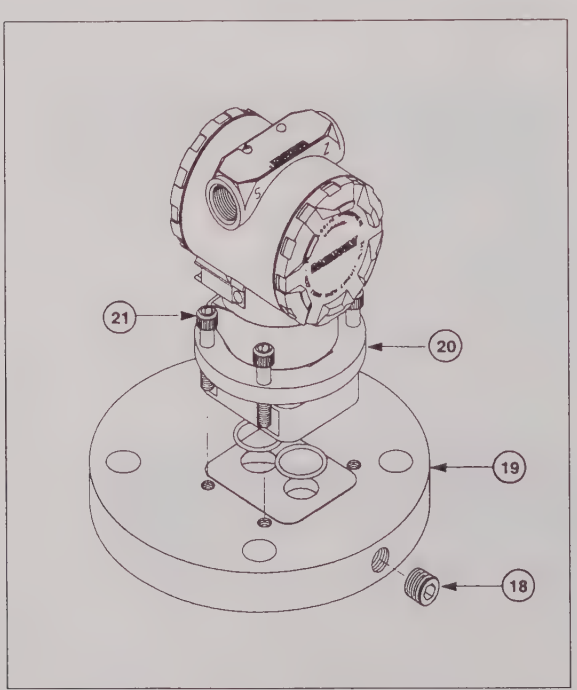
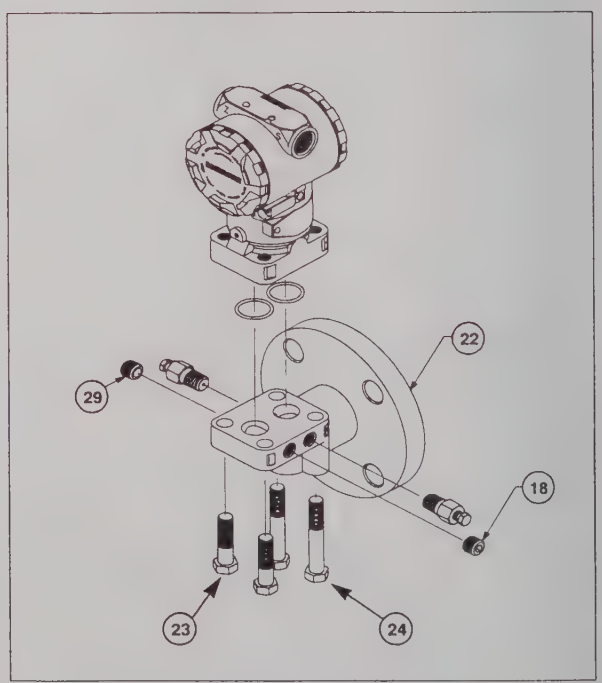
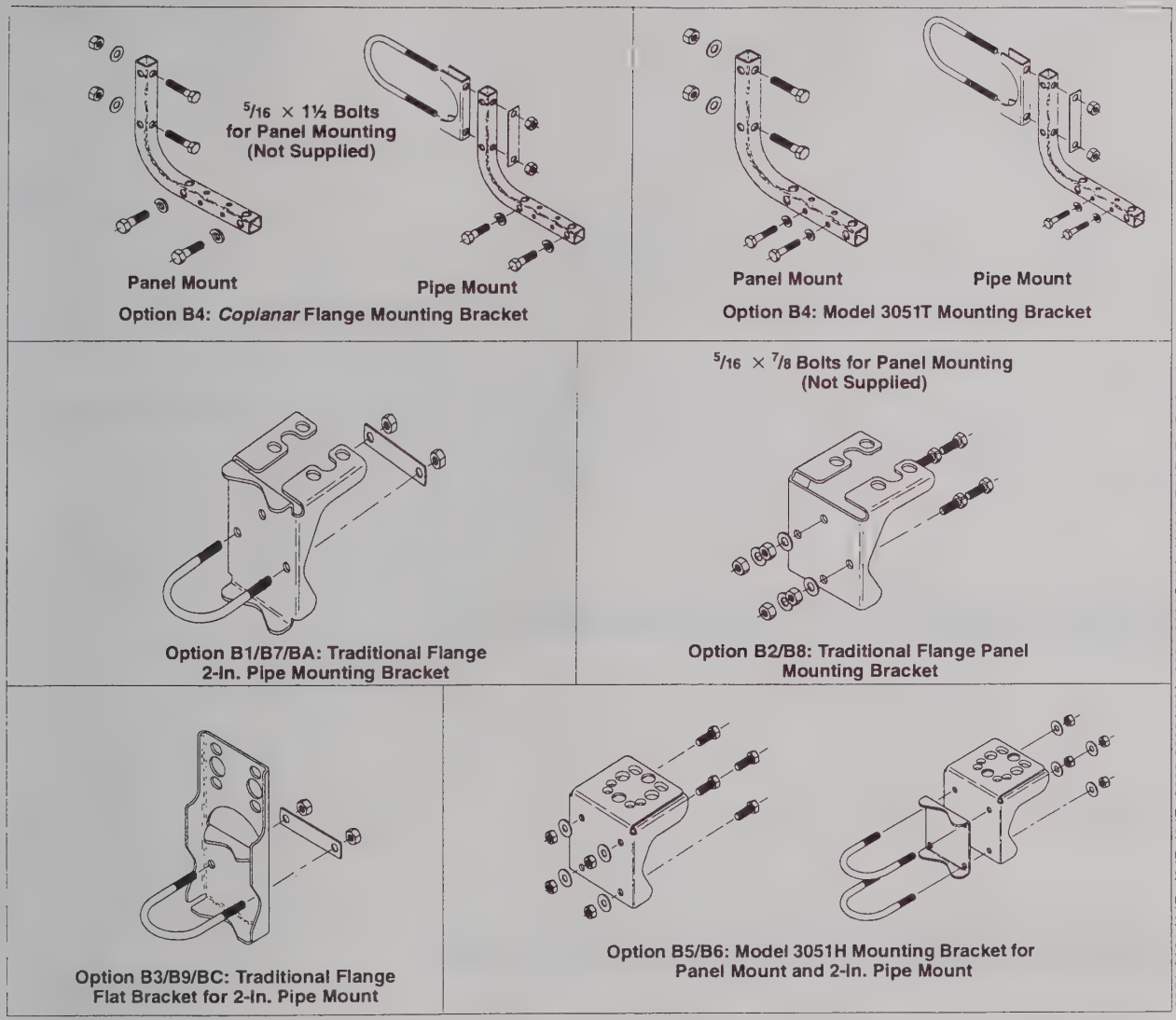


FIGURE 5-11. Level Flange, Horizontal Mount.



3051-3031B16A 3001-3001A01D

FIGURE 5-12. Level Flange, Vertical Mount.


5/16 × 1½ Bolts
for Panel Mounting
(Not Supplied)
Panel Mount
Pipe Mount
Option B4: Coplanar Flange Mounting Bracket
Panel Mount
Pipe Mount
Option B4: Model 3051T Mounting Bracket
5/16 × 7/8 Bolts for Panel Mounting
(Not Supplied)
Option B1/B7/BA: Traditional Flange
2-In. Pipe Mounting Bracket
Option B2/B8: Traditional Flange Panel
Mounting Bracket
Option B3/B9/BC: Traditional Flange
Flat Bracket for 2-In. Pipe Mount
Option B5/B6: Model 3051H Mounting Bracket for
Panel Mount and 2-In. Pipe Mount

3051-3031-I04B, J04B, I04B, 2008-2008A04A, 3051-3031C19A, H19A, E19B, F19B, G19A

FIGURE 5-13. Mounting Bracket Kits.

Section 6

Options

OVERVIEW

Options available with the Model 3051 can ease installation and enhance the security of control systems. These options include the integral zero and span adjustments, LCD meters, mounting brackets, custom configurations, the level flange, the traditional flange, optional bolt materials, and the transient protection terminal block.

SAFETY MESSAGES

Procedures and instructions in this section may require special precautions to ensure the safety of the personnel performing the operations. Information that raises potential safety issues is indicated by a warning symbol (⚠). Refer to the following safety messages before performing an operation preceded by this symbol.

Warnings (⚠)

⚠WARNING

Explosions can result in death or serious injury.

- Do not remove the instrument cover in explosive environments when the circuit is alive.
- Both transmitter covers must be fully engaged to meet explosion-proof requirements.
- Before connecting a communicator in an explosive atmosphere, make sure the instruments in the loop are installed in accordance with intrinsically safe or nonincendive field wiring practices.

⚠WARNING

Electrical shock can result in death or serious injury.

- Avoid contact with the leads and the terminals.

INTEGRAL ZERO AND SPAN ADJUSTMENT OPTIONS

The integral zero and span adjustments can be used for adjusting the analog output without the use of a communicator. Several options are available to customize the local zero and span adjustments. The J1 option only provides the external zero adjustment that enables the user to rezero the transmitter locally. The J3 option excludes both the zero and span adjustments for security purposes.

The push-button span and zero adjustments are hidden by the certifications label on top of the transmitter. Loosen the label screw and rotate the label 180 degrees counterclockwise to expose the adjustments.

Disabling the Zero and Span Adjustments

For security reasons, or to prevent accidental changes to the configuration data, there are three methods of controlling the local zero and span adjustments:

Method 1: Transmitter Security Jumper
Enabling the transmitter security jumper on the circuit board prevents changes to transmitter configuration information by both the HART Communicator and the local zero and span adjustments (see "Transmitter Security" on page 2-4).

Method 2: Communicator Software Lockout Sequence
The communicator software lockout sequence disables only the span and zero adjustments; changes can still be made using the HART communicator (see "Local Span and Zero Control" on page 2-12).

Method 3: Remove the Zero and Span Buttons
To remove the local zero and span buttons, use a small screwdriver to remove the blue plastic cover plate securing the buttons to the transmitter housing. After you remove the cover plate, the button assemblies – including buttons, springs, and magnets – will slide out. If you intend to use the button at some time in the future, store the buttons separately to ensure that the magnets maintain their proper magnetic strength.

LCD METER

The LCD meter provides local indication of the output, and abbreviated diagnostic messages governing transmitter operation. The meter is located on the electronics module side of the transmitter, maintaining direct access to the signal terminals. An extended cover is required to accommodate the meter.

The meter features a two-line display that accommodates five digits for reporting the process variable on the top line, and six characters for displaying engineering units on the bottom line(1). And in addition to units of pressure, the new LCD meter is capable of displaying flow and volume units. The meter uses both lines to display diagnostic messages. You can configure the meter to display the following information:

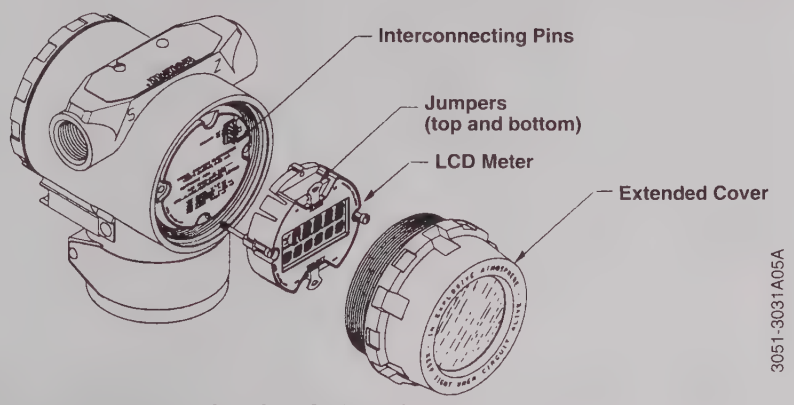
- Engineering Units
- Percent of Range
- User-Configurable LCD Scale(2)
- Alternating between any two of the above

The user-configurable scale is a new feature that enables you to configure the LCD meter to a custom scale for flow or volume. The configuration of the meter can be done using a Model 275 HART Communicator. With the user configurable scale feature, you can define the decimal point position, the upper range value, the lower range value, the engineering units, and the transfer function.

The meter transfer function is independent of the transmitter analog output transfer function, which allows the meter to display square root flow output while the analog output remains linear with the pressure input.

(1) Previous versions differ slightly.
(2) Not available on previous versions of the LCD meter, or with low power transmitters.

FIGURE 6-1. Exploded View of the Model 3051 with Optional LCD Meter.



Installing the Meter

For transmitters ordered with the LCD meter, the meter is shipped installed. Installing the meter on an existing Model 3051 transmitter requires a small instrument screwdriver and the meter kit.

The kits vary depending on the version of transmitter electronics. Examine the following numbers carefully to ensure you are installing the correct kit.

For use with Shrouded Electronics Board

Meter Kits

Option M5: P/N 03031-0193-0101
Option M6: P/N 03031-0193-0111

For use with Non-Shrouded Electronics Board

Meter Kits

Option M5: P/N 03031-0193-0001
Option M6: P/N 03031-0193-0011

The meter kit includes:

- one LCD meter assembly
- one extended cover with cover O-ring installed
- two nylon standoffs
- two captive screws
- one ten -pin interconnection header

Use the following procedure and Figure 6-1 to install the LCD meter. If the meter is an upgrade from a previous version, upgrade the electronics board before attempting to install the meter.

1. If the transmitter is installed in a loop, secure the loop and disconnect power.
2. ⚠ Remove the transmitter cover opposite the field terminal side. Do not remove the instrument covers in explosive environments when the circuit is alive.
3. Remove the failure mode and alarm jumpers from the electronics module, and insert them in their new positions above and below the meter readout on the meter assembly.

NOTE
On previous versions, remove only the alarm jumper.

4. Insert the interconnection header in the ten-pin(1) socket exposed by removal of the jumpers.
5. Remove the two captive screws from the electronics module. To do so, loosen the screws to release the module, then pull out the

(1) Previous versions of the meter use a six-pin connector.

screws until they are stopped by the captive thread inside of the circuit board standoffs. Continue loosening the screws and remove them.

6. Rotate the electronics housing up to 180 degrees (left or right) to improve field access to the two compartments or to better view the optional LCD meter. To rotate the housing, release the housing rotation set screw and turn the housing not more than 180 degrees from the orientation shown in Figure 6-2. To rotate the housing greater than 180 degrees, follow Steps 1–6 of the disassembly procedure in **Section 4 Troubleshooting**.

NOTE
Do not rotate the housing greater than 180 degrees without first following the disassembly procedure in **Section 4 Troubleshooting**. Rotating the housing greater than 180 degrees will damage the sensor module and void the Rosemount warranty.

7. Decide which direction to orient the meter. Insert the long meter screws into the two holes on the meter assembly that coincide with the holes on the electronics module. You can install the meter in 90-degree increments for easy viewing. Position one of the four connectors on the back of the meter assembly to accept the interconnection header.
8. Attach the meter assembly to the electronics module by threading the screws into the captive threads and attaching the meter assembly to the interconnection pins. Tighten the screws to secure the meter assembly and electronics board in place.
9. ⚠ Attach the extended cover, and tighten. Transmitter covers must be fully engaged to meet explosion proof requirements and to achieve the proper environmental seal.

Note the following LCD temperature limits:

Operating: –4 to 175 °F (–20 to 80 °C)
Storage: –40 to 185 °F (–40 to 85 °C)

NOTE
Electronics board revision 5.3 or later (all shrouded designs) have increased functionality that allows verification testing of alarm current levels. If you repair or replace the transmitter electronics board, sensor module or LCD meter, it is recommended that you verify the transmitter alarm level before you return the transmitter to service (see "Alarm Level Verification" on page 2-4).

FIGURE 6-2. Model 3051 with Optional LCD Meter.

⚠ See "Safety Messages" on page 6-1 for complete warning information.

Diagnostic Messages

In addition to the output, the LCD meter displays abbreviated operation, error, and warning messages for troubleshooting the transmitter. Messages appear according to their priority, with normal operating messages appearing last. To determine the cause of a message, use a Model 275 HART Communicator to further interrogate the transmitter. A description of each LCD diagnostic message follows.

Error

Error messages appear on the LCD meter display to inform you of serious problems effecting the operation of the transmitter. The meter displays an error message until the error condition is corrected, and the analog output is driven to the specified alarm level. No other transmitter information is displayed during an alarm condition.

FAIL[1]

The transmitter CPU board and the sensor module are incompatible. If you encounter this message, contact Rosemount Customer Central at 800-999-9307 if you need assistance.

FAIL MODULE

The sensor module is disconnected or is malfunctioning. Verify that the sensor module ribbon cable is connected to the back of the electronics board. If the ribbon cable is properly connected, there is a problem within the sensor module. Possible sources of problems include:

- Pressure or temperature updates are not being received in the sensor module
- A non-volatile memory fault that will effect transmitter operation has been detected in the module by the memory verification routine

Some non-volatile memory faults are user-repairable. Use a Model 275 HART Communicator to diagnose the error and determine if it is repairable. Any error message that ends in "FACTORY" is not repairable. In cases of non user-repairable errors, you must replace the sensor module. See "Disassembly Procedures" on page 4-3, or contact Rosemount Customer Central at 800-999-9307 if you need assistance.

FAIL ELECT

The transmitter electronics board is malfunctioning due to an internal fault. Some of the FAIL ELECT errors are user-repairable. Use a Model 275 HART Communicator to diagnose the error and determine if it is repairable. Any error message that ends in "FACTORY" is not repairable. In cases of non user-repairable errors, you must replace the electronics board. See "Remove the Electronics Board" on page 4-4, or contact Rosemount Customer Central at 800-999-9307 if you need assistance.

FAIL CONFIG

A memory fault has been detected in a location that could effect transmitter operation, and is user-accessible. To correct this problem, use a Model 275 HART Communicator to interrogate and reconfigure the appropriate portion of the transmitter memory. Contact Rosemount Customer Central at 800-999-9307 if you need assistance.

(1) With previous versions of the Model 3051, FAIL MODULE and FAIL ELECT were also grouped into the FAIL message. When dealing with a FAIL message on a previous version of the Model 3051, review the information in the FAIL MODULE and FAIL ELECT sections as well.

Warnings

Warnings appear on the LCD meter display to alert you of user-repairable problems with the transmitter, or current transmitter operations. Warnings appear alternately with other transmitter information until the warning condition is corrected or the transmitter completes the operation that warrants the warning message.

NOTE
The warning messages on previous versions of the LCD meter may vary slightly from those listed here, but they represent the same warning.

PRESS LIMIT
The process variable read by the transmitter is outside of sensor range limits.

TEMP LIMIT
The secondary temperature variable read by the electronics is outside of transmitter range.

CURR FIXED
The transmitter is in multidrop mode. The analog output is not tracking pressure changes.

CURR SATURD
The pressure read by the module is outside of the specified range, and the analog output has been driven to saturation levels (see "Failure Mode Alarm" on page 2-2).

LOOP TEST
A loop test is in progress. During a loop test or 4–20 mA trim, the analog output is set to a fixed value. The meter display alternates between the current selected in milliamps and "LOOP TEST."

XMTR INFO
A non-volatile memory fault has been detected in the transmitter memory by the memory verification routine. The memory fault is in a location containing transmitter information. To correct this problem, use a Model 275 HART Communicator to interrogate and reconfigure the appropriate portion of the transmitter memory. This warning does not effect the transmitter operation. Contact Rosemount Customer Central at 800-999-9307 if you need assistance.

Operation

Normal operation messages appear on the LCD meter to confirm actions or inform you of transmitter status. Operation messages are displayed with other transmitter information, and warrant no action to correct or alter the transmitter settings.

ZERO PASS
The zero value, set with the local zero adjustment button, has been accepted by the transmitter, and the output should change to 4 mA.

ZERO FAIL
The zero value, set with the local zero adjustment button, exceeds the maximum rangedown allowed for a particular range, or the pressure sensed by the transmitter exceeds the sensor limits.

SPAN PASS
The span value, set with the local span adjustment button, has been accepted by the transmitter, and the output should change to 20 mA.

SPAN FAIL

The span value, set with the local span adjustment button, exceeds the maximum rangedown allowed for a particular range, or the pressure sensed by the transmitter exceeds the sensor limits.

LOCAL DSBLD

This message appears during reranging with the integral zero and span buttons and indicates that the transmitter local zero and span adjustments have been disabled. The adjustments may have been disabled by the transmitter security jumper on the transmitter circuit board or through software commands from the Model 275. Refer to "Transmitter Security" on page 2-4 for information on the position of the security jumper, and "Disabling the Zero and Span Adjustments" on page 6-2 for information on the software lockout.

WRITE PROTCT

This message appears if you attempt to change the transmitter configuration data while the security jumper is in the "ON" position. See "Transmitter Security" on page 2-4 for more information about the security jumper.

Custom Meter Output

You can configure the meter for custom output using either a Model 275 HART Communicator or AMS. If you are using AMS, select the Local Display tab from the Configuration Properties Screen. If you are using a HART Communicator, perform the following procedure:

1. Establish communication between the communicator and the transmitter that you wish to upgrade. Before connecting a communicator in an explosive atmosphere, make sure the instruments in the loop are installed in accordance with intrinsically safe or nonincendive field wiring practices.
2. From the **Online** screen, select *1 Device Setup*, *3 Basic Setup*, *7 Meter Options*, *1 Meter Type*.
   The **Meter type** screen appears.
3. From the **Meter type** screen, select one of the following options: *Custom Meter display*, *Alt custom | Eng unit*, or *Alt custom | %*
   The **Meter options** screen appears.
4. From the **Meter options** screen, select *2 CM Setup*.
   The CM Setup screen appears, and you are prompted to enter the five variables (decimal point position, upper value, lower value, units, and transmitter function) that define the meter output.
5. Select *1 Sel dec pt pos* to select the decimal point position that will provide the greatest resolution for your desired output. For example, for an output of 0 to 75 GPM, select *4 XX.XXX*.
6. Select *F2 Send* to send this information to the transmitter.
7. Select *2 CM Upper Value*, and enter the value that you wish the transmitter to read at the 20 mA point.
8. Select *3 CM Lower Value*, and enter the value that you wish the transmitter to read at the 4 mA point.
9. Select *4 CM Units*, and enter the custom units (five characters maximum) that you wish the meter to display.
10. Select *5 CM xf fnct*, and enter the transmitter transfer function for the meter. Select *Sq root* for displaying flow units.

NOTE
The custom meter transfer function is independent of the analog output transfer function.

11. Select *(F2) Send* to send the configuration information to the transmitter.

MOUNTING BRACKETS

Optional mounting brackets available with the Model 3051 facilitate mounting to a 2-inch pipe or to a panel. The standard bracket (Option B4) for use with the Coplanar flange and the Model 3051T is stainless steel with stainless steel bolts. Figure 3-11 on page 3-13 shows bracket dimensions and mounting configurations for the B4 option.

Options B1–B3 and B7–B9 are sturdy, epoxy-polyester-painted brackets designed for use with the traditional flange. The B1–B3 brackets have carbon steel bolts, while the B7–B9 brackets have stainless steel bolts. The BA and BC brackets are stainless steel with stainless steel bolts. The B1/B7/BA and B3/B9/BC style brackets support 2-inch pipe mounting installations, and the B2/B8 style brackets support panel mounting. Figure 3-14 on page 3-15 shows these optional mounting brackets.

When installing the transmitter to one of the optional mounting brackets, torque the bolts to 125 inch-pounds. See "Mounting" on page 3-9 for additional mounting considerations.

Custom Configuration (C1)

The C1 option allows the customer to specify the following data in addition to the standard configuration parameters in the software memory:

Descriptor, Message, Date, Damping, Remote Seal, Custom Meter Display Configuration, Burst Mode Configuration, Multidrop Configuration, Alarm Jumper Setting, Local Zero and Span Control, Write Protect Jumper Setting.

You will find a Model 3051 configuration data sheet beginning on page 6-12. Use the CDS to record configuration data and options.

Level Flange (F1, F2, G1, and G2) (FA, FB, FC, and FD)

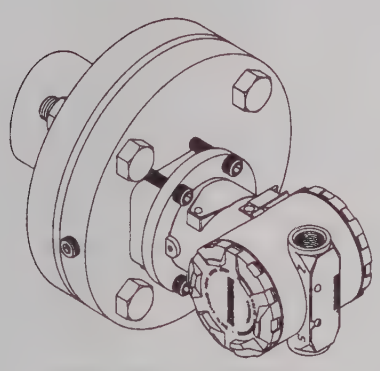
This option provides a flange for the Model 3051C that converts it to a horizontal mount level transmitter or a vertical mount level transmitter. A vented fitting on the low pressure side of the flange makes it suitable for use with a gage pressure transmitter. The fitting can be removed and replaced with impulse piping or wet leg connections when a low pressure reference is required for differential pressure measurements.

Horizontal Mount (F1, F2, G1, and G2)

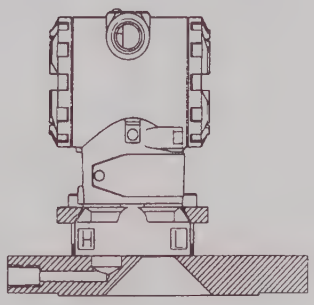
Figure 6-3 shows the horizontal mount level flange. Flanges are available in the sizes and ratings indicated by the following option codes:

Option	Description	Flange Rating
F1	316 SST, 3 in., ANSI Class 150, Horizontal Mount	275 psi at 100 °F
F2	316 SST, 3 in., ANSI Class 300, Horizontal Mount	720 psi at 100 °F
G1	Carbon Steel, 3 in., ANSI Class 150, Horizontal Mount	285 psi at 100 °F
G2	Carbon Steel, 3 in., ANSI Class 300, Horizontal Mount	740 psi at 100 °F

FIGURE 6-3. Horizontal Mount Level Flange.



Horizontal Mount Level Flange Mounted to a Tank Flange



Cross Section of Horizontal Mount Level Flange

3051-3051A16A, C16B

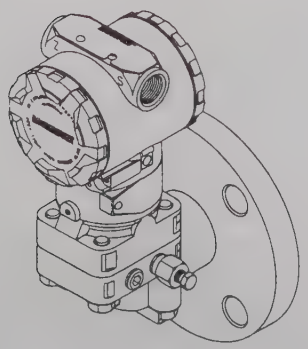
NOTE
Options F2 and G2 require eight flange bolts. Bolts supplied to mount the horizontal mount level flange to the sensor module are 316 stainless steel.

Vertical Mount (FA, FB, FC, FD, FP, and FQ)

Figure 6-4 shows the vertical mount level flange. Flanges are available in the sizes and ratings indicated by the following option codes:

OPTION	DESCRIPTION	FLANGE RATING
FA	316 SST, 2 in., ANSI Class 150, Vertical Mount	275 psi at 100 °F
FB	316 SST, 2 in., ANSI Class 300, Vertical Mount	720 psi at 100 °F
FC	316 SST, 3 in., ANSI Class 150, Vertical Mount	275 psi at 100 °F
FD	316 SST, 3 in., ANSI Class 300, Vertical Mount	720 psi at 100 °F
FP	DIN Level Flange, SST, DN 50, PN 40, Vertical Mount	40 bar at 120 °C
FQ	DIN Level Flange, SST, DN 80, PN 40, Vertical Mount	40 bar at 120 °C

FIGURE 6-4. Vertical Mount Level Flange.



3001-3001A01A

Traditional Flange (H2, H3, H4, and H7)

The traditional flange option converts the mounting configuration of the Model 3051 to one similar to traditional style transmitters. This allows the Model 3051 to replace traditional transmitters without changing existing manifolds, impulse piping, or bracket arrangements. The traditional flange also allows a higher process temperature at the process ports (300 °F [149 °C]) because of its ability to dissipate heat. Process ports on the traditional flange meet DIN STD. 19213 with 2.13-in. (54-mm) ±0.008 in. connection centers. Different traditional flange materials of construction are as follows:

H2: 316SST, SST drain vent valves, and SST flange adapters.

H3: Hastelloy C, Hastelloy C drain vent valves, Hastelloy C flange adapters.

H4: Monel, Monel drain vent valves, Monel flange adapters.

H7: 316SST, Hastelloy C drain/vent valves, SST flange adapters.

The traditional flange fits most existing mounting brackets. If a new bracket is required, use one of the bracket options described earlier. Figure 6-5 shows the traditional flange.

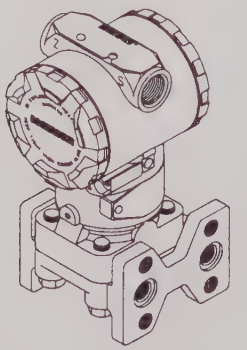
Figure 3-17 on page 3-19 shows the bolts used to mount the traditional flange to the transmitter. The ¾-inch bolts supplied with the standard Anderson, Greenwood & Co. manifold (Rosemount Part No. 1151-0150-0001 or 1151-0150-0002) will fit the traditional flange and manifold. Bolts supplied with other manifolds may need a 7/16 -in. washer to accommodate the extra length. The user should make sure the mounting bolt in the upper corner of the traditional flange does not push against the module. A clearance of at least 1/16 -in. should be allowed. Install the manifold bolts following the guidelines on Page 3-17.

Optional Flange and Adapter Bolts (L4, L5, L6)

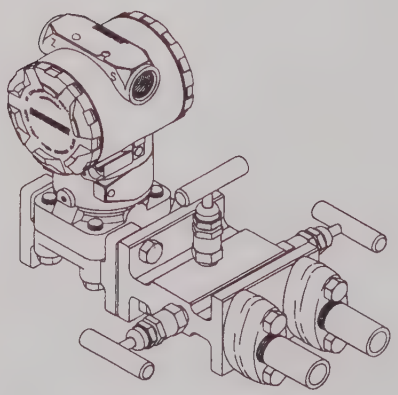
Option codes L4, L5, and L6 replace the standard carbon steel flange and adapter bolts with alternative materials as described:

L4: Austenitic 316 stainless steel bolts
L5: ASTM-A-193-B7M bolts
L6: Monel bolts

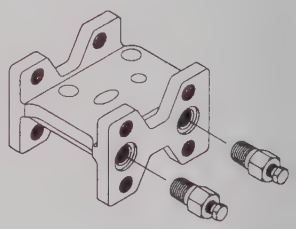
FIGURE 6-5. Traditional Flange.



TRADITIONAL FLANGE AND MODEL 3051C
300 °F (149 °C) Temperature Limit
at Process Ports



CONNECTION TO A MANIFOLD



TRADITIONAL FLANGE
WITH DRAIN/VENTS

3051-3051B07C,A, 3031A35A

Transient Protection Terminal Block (T1)

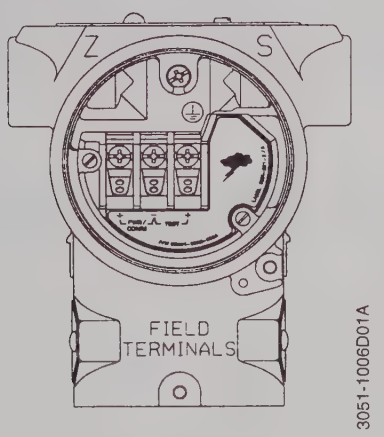
The transient protection terminal block option increases the Model 3051 Pressure Transmitter's ability to withstand electrical transients induced by lightning, welding, heavy electrical equipment, or switch gears. Model 3051 Pressure Transmitters, with integral transient protection installed, meet the standard performance specifications as outlined in this product manual. In addition, the transient protection circuitry meets IEEE Standard 587, Category B and IEEE Standard 472, Surge Withstand Capability.

Transient protection terminal blocks can be ordered as an option (Option Code T1), or as a spare part to retrofit existing Model 3051 transmitters in the field. The spare part number for the transient protection terminal block assembly is 03031-0332-0002.

NOTE
Installation of the transient protection terminal block does not provide transient protection unless the Model 3051 transmitter case is properly grounded. See Page 3-22 for grounding information.

The transient protection terminal block option is not offered with Option Code I1 (BASEEFA/CENELEC Intrinsic Safety Certification).

FIGURE 6-6. Transient Protection Terminal Block (Option Code T1).



Installation Procedure

Option Code T1 is shipped installed when ordered at the same time as the Model 3051. To install the transient protection terminal block on an existing transmitter, refer to "Remove the Terminal Block" on page 4-3 to remove the existing terminal block, and refer to "Install the Terminal Block" on page 4-8 to install the transient protection terminal block.

TABLE 6-1. Model 3051 Configuration Data Sheet.

CONFIGURATION DATA SHEET

Customer: _____ P.O. No.: _____
Model No.: _____ Line Item: _____
SST Tag No.: _____
Software Tag: |_|_|_|_|_|_|_|_|

OUTPUT INFORMATION: (Software Selectable)

Key to Symbols
★ = Default Value(1)

4 mA (1, 0.8 Volts) = _____ 0★
20 mA (5, 3.2 Volts) = _____ Upper Range Limit★

Pressure Units = ☐ inH_2O★(2) ☐ psi★(3) ☐ Pa ☐ ftH_2O
☐ inHg ☐ bar ☐ kPa ☐ g/cm^2
☐ mbar ☐ Torr ☐ mmH_2O ☐ inH_2O at 4 °C(5)
☐ Atm ☐ kg/cm^2 ☐ mm Hg ☐ mmH_2O at 4 °C(5)

Output = ☐ Linear★ ☐ Square Root (For DP transmitters only)

Damping(4) = ☐ 0.00 seconds ☐ 0.05 seconds ☐ 0.10 seconds ☐ 0.20 seconds ☐ 0.40 seconds★
☐ 0.80 seconds ☐ 1.60 seconds ☐ 3.20 seconds ☐ 12.8 seconds ☐ 25.6 seconds

TRANSMITTER INFORMATION: (Software Selectable)

Descriptor(4): |_|_|_|_|_|_|_|_|_|_|_|_|_|_|_|_|
(16 characters)

Message(4): |_|_|_|_|_|_|_|_|_|_|_|_|_|_|_|_|_|_|_|_|_|_|_|_|_|_|_|_|_|_|_|_|
(32 characters)

Date(4): ☐☐/☐☐/☐☐
Day Month Year

Local Span and Zero: ☐ Enabled★ ☐ Disabled

LCD METER CONFIGURATION (Software Adjustable – M5 or M6 option must be specified in model number)

Meter Display Type:(4)

☐ Eng. Units only ☐ Alternate Eng. Units & % of Range ★
☐ % of Range only ☐ Alternate Eng. Units & Custom Display(5)
☐ Custom Display only(5) ☐ Alternate % of Range & Custom Display(5)

Custom Display Configuration: (must be filled out if Custom Display is selected as meter type)

Decimal Point Position (fixed)
Indicate decimal point location X□X□X□X□X□

Enter Lower Range Value (Decimal point must be in the same position as specified above.)
(circle sign) + − ☐☐☐☐☐☐☐ Default is +000.00

Enter Upper Range Value (Decimal point must be in the same position as specified above.)
(circle sign) + − ☐☐☐☐☐☐☐ Default is +100.00

Custom Units
Available characters: A-Z, 0-9, /, *, %, (blank)
☐☐☐☐☐ Default is %RNGE

Custom Display Transfer Function (Independent of Analog Output)
☐ Linear★
☐ Square Root

(1) Default values may be different outside the U.S.A. Consult your Rosemount Sales Representative for details.
(2) inH_20 for CD/CG Ranges 1–3.
(3) psi for CD/CG Ranges 4 and 5, all CA ranges.
(4) C1 Option required for configuration of this parameter.
(5) Not available with low power output.

HARDWARE SELECTABLE INFORMATION

Alarm Option: ☐ High ★ ☐ Low

Transmitter Security: ☐ Off★ ☐ On

NOTE:
Specify C4 Option in model structure when ordering NAMUR-compliant alarm and saturation limits.(1)

SIGNAL SELECTION: (Software Selectable)

☐ 4–20 mA with simultaneous digital signal based on *HART* protocol★

☐ Burst mode of *HART* digital process variable(2)

Burst mode output options:

- ☐ Primary variable in engineering units
- ☐ Primary variable in percent of range
- ☐ All dynamic variables in engineering units
- ☐ All dynamic variables in engineering units and the primary variable mA value

☐ Multidrop Communication(3)(2) Choose transmitter address (1-15)(4): _____

(1) Not available with low power output.
(2) C1 Option required for configuration of this parameter
(3) This option fixes the transmitter analog output at 4mA.
(4) Default address is 1 if multidrop communication is selected.

Model 3051C Differential/Gage Pressure Transmitter Range Limits

Units	Range 1 Span		Range 2 Span		Range 3 Span		Range 4 Span		Range 5 Span	
	min	max	min	max	min	max	min	max	min	max
inH_2O	0.5	25	2.5	250	10	1000	83.040	8304	553.60	55360
inHg	0.03678	1.8389	0.18389	18.389	0.73559	73.559	6.1081	610.81	40.720	4072.04
ftH_2O	0.04167	2.08333	0.20833	20.8333	0.83333	83.3333	6.9198	691.997	46.13	4613.31
mmH_2O	12.7	635.5	63.553	6355	254	25421	2110.95	211095	14073	1407301
mmHg	0.93416	46.7082	4.67082	467.082	18.6833	1868.33	155.145	15514.5	1034.3	103430
psi	0.01806	0.903	0.0902	9.03183	0.36127	36.127	3	300	20	2000
bar	0.00125	0.06227	0.00623	0.62272	0.02491	2.491	0.20684	20.6843	1.37895	137.895
mbar	1.2454	62.2723	6.22723	622.723	24.9089	2490.89	206.843	20684.3	1378.95	137895
g/cm^2	1.26775	63.3875	6.33875	633.875	25.355	2535.45	210.547	21054.7	1406.14	140614
kg/cm^2	0.00127	0.0635	0.00635	0.635	0.0254	2.54	0.21092	21.0921	1.40614	140.614
Pa	124.545	6227.23	622.723	62160.6	2490.89	249089	20684.3	2068430	137895	13789500
kPa	0.12545	6.2272	0.62272	62.2723	2.49089	249.089	20.6843	2068.43	137.895	13789.5
torr	0.93416	46.7082	4.67082	467.082	18.6833	1868.33	155.145	15514.5	1034.3	103430
atm	0.00123	0.06146	0.00615	0.61460	0.02458	2.458	0.20414	20.4138	1.36092	136.092

NOTE
When used with the HART Communicator Model 275 or the Rosemount Model 268 Communicator, ±5% adjustability is allowed on the sensor limit to allow for unit conversions.

Model 3051P Differential/Gage Pressure Transmitter Range Limits

Units	Range 2 Span		Range 3 Span		Range 4 Span[1]		Range 5 Span[1]	
	min	max	min	max	min	max	min	max
inH_2O	25	250	100	1000	830.40	8304	5536.0	55360
inHg	1.8389	18.389	7.3559	73.559	61.081	610.81	407.20	4072.04
ftH_2O	2.08333	20.8333	8.3333	83.3333	69.200	691.997	461.3	4613.31
mmH_2O	635.5	6355	2542	25421	21109.5	211095	140730	1407301
mmHg	46.7082	467.082	186.833	1868.33	1551.45	15514.5	10343	103430
psi	0.903	9.03183	3.6127	36.127	30	300	200	2000
bar	0.06227	0.62272	0.2491	2.491	2.0684	20.6843	13.7895	137.895
mbar	62.2723	622.723	249.089	2490.89	2068.43	20684.3	13789.5	137895
g/cm^2	63.3875	633.875	253.55	2535.45	2105.47	21054.7	14061.4	140614
kg/cm^2	0.0635	0.635	0.254	2.54	2.1092	21.0921	14.0614	140.614
Pa	6216.06	62160.6	24908.9	249089	206843	2068430	1378950	13789500
kPa	6.2272	62.2723	24.9089	249.089	206.843	2068.43	1378.95	13789.5
torr	46.7082	467.082	186.833	1868.33	1551.45	15514.5	10343	103430
atm	0.06146	0.61460	0.2458	2.458	2.0414	20.4138	13.6092	136.092

NOTE

When used with the HART Communicator Model 275 or the Rosemount Model 268 Communicator, ±5% adjustability is allowed on the sensor limit to allow for unit conversions.

(1) Range 4 and 5 spans are only available with gage pressure transmitters.

Model 3051L/3051H Pressure Transmitter Range Limits

Units	Range 2 Span		Range 3 Span		Range 4 Span		Range 5 Span (3051H Only)	
	min	max	min	max	min	max	min	max
inH_2O	2.5	250	10	1000	83.040	8304	553.60	55360
inHg	0.18389	18.389	0.73559	73.559	6.1081	610.81	40.720	4072.04
ftH_2O	0.20833	20.8333	0.83333	83.3333	6.9198	691.997	46.13	4613.31
mmH_2O	63.553	6355	254	25421	2110.95	211095	14073	1407301
mmHg	4.67082	467.082	18.6833	1868.33	155.145	15514.5	1034.3	103430
psi	0.0902	9.03183	0.36127	36.127	3	300	20	2000
bar	0.00623	0.62272	0.02491	2.491	0.20684	20.6843	1.37895	137.895
mbar	6.22723	622.723	24.9089	2490.89	206.843	20684.3	1378.95	137895
g/cm^2	6.33875	633.875	25.355	2535.45	210.547	21054.7	1406.14	140614
kg/cm^2	0.00635	0.635	0.0254	2.54	0.21092	21.0921	1.40614	140.614
Pa	622.723	62160.6	2490.89	249089	20684.3	2068430	137895	13789500
kPa	0.62272	62.2723	2.49089	249.089	20.6843	2068.43	137.895	13789.5
torr	4.67082	467.082	18.6833	1868.33	155.145	15514.5	1034.3	103430
atm	0.00615	0.61460	0.02458	2.458	0.20414	20.4138	1.36092	136.092

NOTE

When used with the HART Communicator Model 275 or the Rosemount Model 268 Communicator, ±5% adjustability is allowed on the sensor limit to allow for unit conversions.

Model 3051T Gage and Absolute Pressure Transmitter Range Limits										
	Range 1 Span		Range 2 Span		Range 3 Span		Range 4 Span		Range 5 Span	
Units	min	max	min	max	min	max	min	max	min	max
inH_2O	8.30397	831.889	41.5198	4159.45	221.439	22143.9	1107.2	110720	55360	276799
inHg	0.61081	61.0807	3.05403	305.403	16.2882	1628.82	81.441	8144.098	4072.04	20360.2
ftH_2O	0.69199	69.3241	3.45998	345.998	18.4533	1845.33	92.2663	9226.63	4613.31	23066.6
mmH_2O	211.10	21130	1054.60	105460.3	5634.66	563466	28146.1	2814613	1407301	7036507
mmHg	15.5145	1551.45	77.5723	7757.23	413.72	41372	2068.6	206860.0	103430	517151
psi	0.3	30	1.5	150	8	800	40	4000	2000	10000
bar	0.02068	3.06843	0.10342	10.3421	0.55158	55.1581	2.75791	275.7905	137.895	689.476
mbar	20.6843	2068.43	103.421	10342.11	551.581	55158.1	2757.91	275790.5	137895	689476
g/cm^2	21.0921	2109.21	105.461	10546.1	561.459	56145.9	2807.31	280730.6	140614	703067
kg/cm^2	0.02109	2.10921	0.10546	10.5461	0.56246	56.2456	2.81228	281.228	140.614	701.82
Pa	2068.43	206843	10342.1	1034212	55158.1	5515811	275791	27579054	13789500	68947600
kPa	2.06843	206.843	10.3421	1034.21	55.1581	5515.81	275.791	27579.05	13789.5	68947.6
torr	15.5145	1551.45	77.5726	7757.26	413.721	413721	2068.6	206859.7	103430	517151
atm	0.02041	2.04138	0.10207	10.2069	0.54437	54.4368	2.72184	272.1841	136.092	680.46

NOTE

When used with the HART Communicator Model 275 or the Rosemount Model 268 Communicator, ±5% adjustability is allowed on the sensor limit to allow for unit conversions.

Model 3051C Absolute Pressure Transmitter Range Limits										
	Range 0 Span		Range 1 Span		Range 2 Span		Range 3 Span		Range 4 Span	
Units	min	max	min	max	min	max	min	max	min	max
inH_2O	4.62254	138.399	8.30397	831.889	41.5198	4151.98	221.439	22143.9	1107.2	110720
inHg	0.34002	10.1801	0.61081	61.0807	3.05403	305.403	16.2882	1628.82	81.441	8144.098
ftH_2O	0.38521	11.5333	0.69199	69.3241	3.45998	345.998	18.4533	1845.33	92.2663	9226.63
mmH_2O	117.510	3518.2	211.10	21130	1054.60	105460.3	5634.66	563466	28146.1	2814613
mmHg	8.63642	258.575	15.5145	1551.45	77.57	7757.25	413.72	41372	2068.6	206860.0
psi	0.16667	5	0.3	30	1.5	150	8	800	40	4000
bar	0.01151	0.344738	0.02068	2.06843	0.10342	10.342	0.55158	55.1581	2.75791	275.7905
mbar	11.5142	344.738	20.6843	2068.43	103.421	10342.1	551.581	55158.1	2757.91	275790.5
g/cm^2	11.74	350.91	21.0921	2109.21	105.27	105.27	561.459	56145.9	2807.31	280730.6
kg/cm^2	0.01174	0.351535	0.02109	2.10921	0.10546	10.546	0.56246	56.2456	2.81228	281.228
Pa	1151.42	34473.8	2068.43	206843	10342.1	1034210	55158.1	5515811	275791	27579054
kPa	1.15142	34.4738	2.06843	206.843	10.3421	1034.21	55.1581	5515.81	275.791	27579.05
torr	8.63642	258.575	15.5145	1551.45	77.5726	7757.26	413.721	413721	2068.6	206859.7
atm	0.01136	0.34023	0.02041	2.04138	0.10207	10.207	0.54437	54.4368	2.72184	272.1841

NOTE

When used with the HART Communicator Model 275 or the Rosemount Model 268 Communicator, ±5% adjustability is allowed on the sensor limit to allow for unit conversions.

Appendix A HART Communicator

INTRODUCTION

This appendix provides basic communicator information on the HART Communicator Model 275 when used with a Model 3051 Smart Pressure Transmitter.

This brief appendix will familiarize you with the HART Communicator but is not meant to replace the HART Communicator product manual. For complete information on the HART Communicator, refer to the HART Communicator Product Manual, publication no. 00809-0100-4275.

NOTE

You must upgrade the software in your HART Communicator in order to take advantage of the additional features of the improved Model 3051. If you initiate communication with an improved Model 3051 using a Communicator that has a previous version of the transmitter Device Descriptors (DDs), the communicator will display the following message:

> NOTICE: Upgrade 275 software to access XMTR function.
> Continue with old description?

If you select YES, the communicator will communicate properly with the transmitter using the existing Model 3051 DDs. However, software features added since the revision of the DDs in the communicator will not be accessible. If you select NO, the communicator will default to a generic transmitter functionality.

Contact your nearest Rosemount Service Center or Sales Representative to upgrade your communicator

SAFETY MESSAGES

Procedures and instructions in this section may require special precautions to ensure the safety of the personnel performing the operations. Information that raises potential safety issues is indicated by a warning symbol (⚠). Refer to the following safety messages before performing an operation preceded by this symbol.

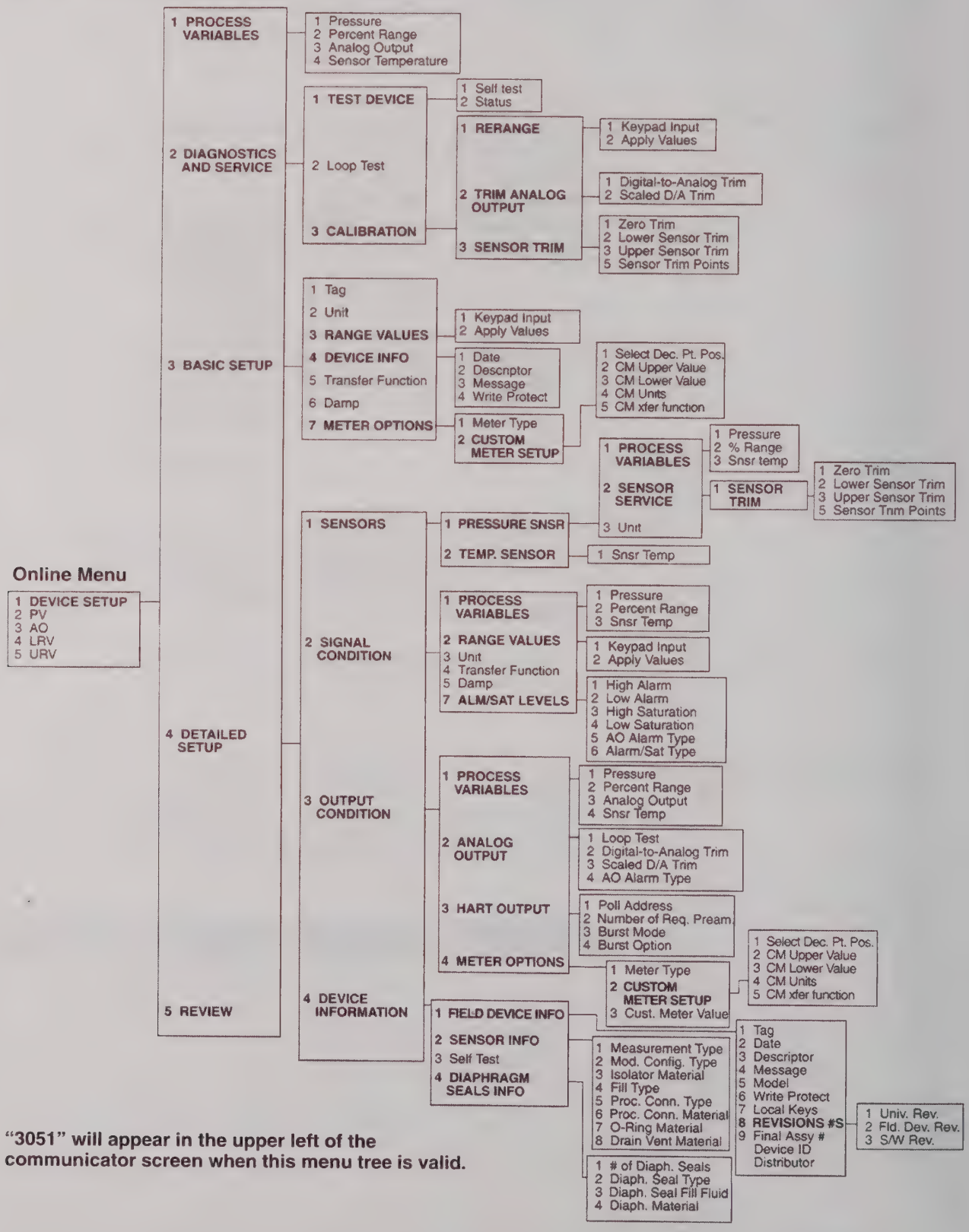
Warnings (⚠)

⚠WARNING

Explosions can result in death or serious injury.

- Do not remove the transmitter covers in explosive environments when the circuit is alive.
- Both transmitter covers must be fully engaged to meet explosion-proof requirements.
- Before connecting a communicator in an explosive atmosphere, make sure the instruments in the loop are installed in accordance with intrinsically safe or nonincendive field wiring practices.

FIGURE A-1. HART Communicator Menu Tree for the *Improved* Model 3051 *.



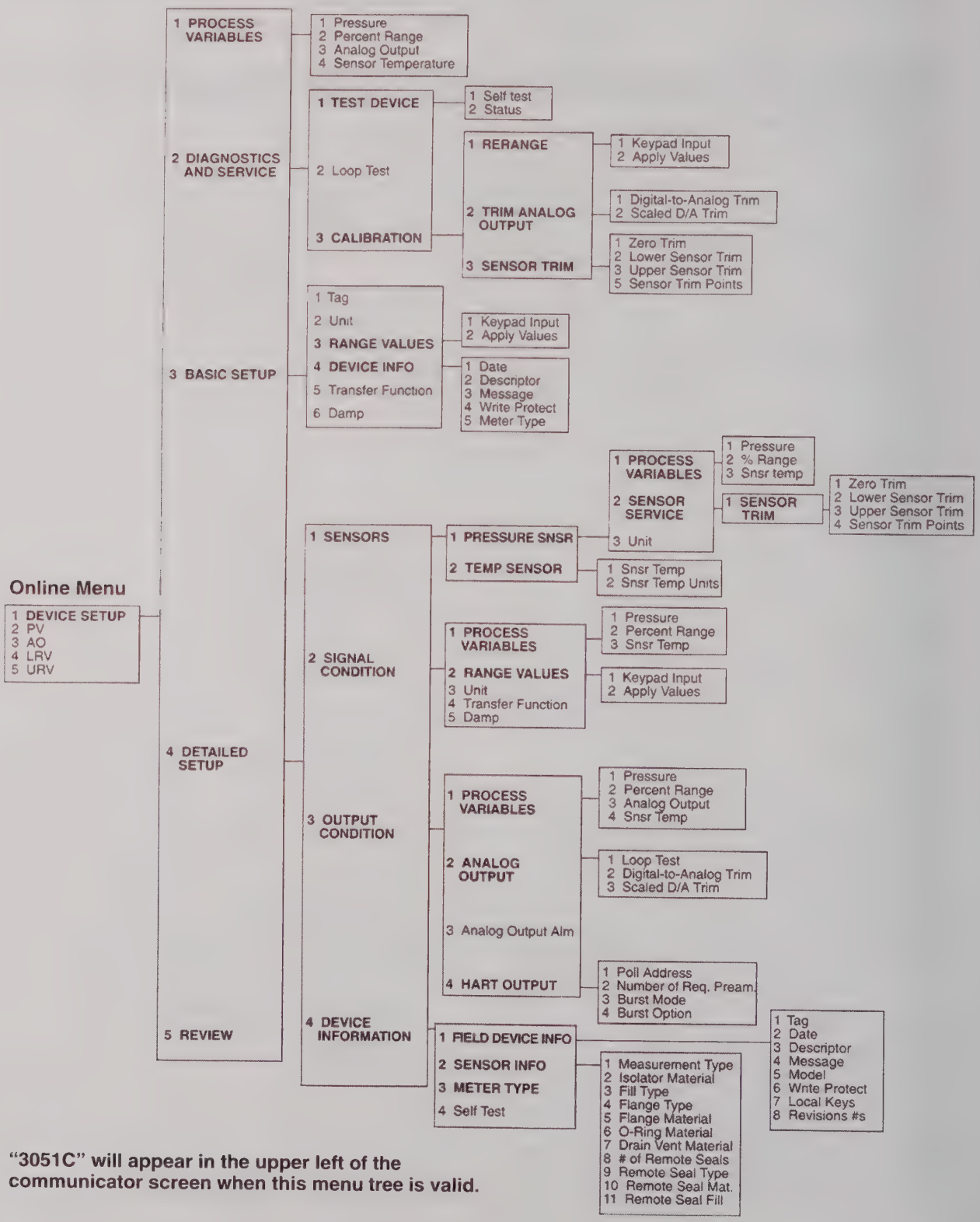
*** "3051" will appear in the upper left of the communicator screen when this menu tree is valid.**

TABLE A-1. HART Fast Key Sequences for the *Improved* Model 3051.

NOTE
A check (✔) indicates the basic configuration parameters. At a minimum, these parameters should be verified as part of the configuration and startup procedures.

Function	HART Communicator Fast Key Sequences
Alarm and Saturation Levels	1, 4, 2, 7
Analog Output Alarm Type	1, 4, 3, 2, 4
Burst Mode Control	1, 4, 3, 3, 3
Burst Operation	1, 4, 3, 3, 3
Clone Data	See **Saving, Recalling, and Cloning Configuration Data** on page 2-22
Custom Meter Configuration	1, 3, 7, 2
Custom Meter Value	1, 4, 3, 4, 3
✔ Damping	1, 3, 6
Date	1, 3, 4, 1
Descriptor	1, 3, 4, 2
Digital To Analog Trim (4–20 mA Output)	1, 2, 3, 2, 1
Disable Local Span/Zero Adjustment	1, 4, 4, 1, 7
Field Device Info	1, 4, 4, 1
Full Trim	1, 2, 3, 3
Keypad Input – Rerange	1, 2, 3, 1, 1
Local Zero and Span Control	1, 4, 4,1, 7
Loop Test	1, 2, 2
Lower Sensor Trim	1, 2, 3, 3, 2
Message	1, 3, 4, 3
Meter Options	1, 4, 3, 4
Number Of Requested Preambles	1, 4, 3, 3, 2
Poll Address	1, 4, 3, 3, 1
Poll a Multidropped Transmitter	Left Arrow, 4, 1, 1
✔ Range Values	1, 3, 3
Rerange	1, 2, 3, 1
Scaled D/A Trim (4–20 mA Output)	1, 2, 3, 2, 2
Self Test (Transmitter)	1, 2, 1, 1
Sensor Info	1, 4, 4, 2
Sensor Temperature	1, 1, 4
Sensor Trim Points	1, 2, 3, 3, 5
Status	1, 2, 1, 2
✔ Tag	1, 3, 1
✔ Transfer Function (Setting Output Type)	1, 3, 5
Transmitter Security (Write Protect)	1, 3, 4, 4
Trim Analog Output	1, 2, 3, 2
✔ Units (Process Variable)	1, 3, 2
Upper Sensor Trim	1, 2, 3, 3, 3
Zero Trim	1, 2, 3, 3, 1

FIGURE A-2. HART Communicator Menu Tree for the *Previous* Model 3051 *.



*** "3051C" will appear in the upper left of the communicator screen when this menu tree is valid.**

TABLE A-2. HART Fast Key Sequences for the *Previous* Model 3051.

NOTE
A check (✔) indicates the basic configuration parameters. At a minimum, these parameters should be verified as part of the configuration and startup procedures.

Function	HART Communicator Fast Key Sequences
Analog Output Alarm	1, 4, 3, 3
Burst Mode Control	1, 4, 3, 4, 3
Burst Operation	1, 4, 3, 4, 4
Clone Data	See **Saving, Recalling, and Cloning Configuration Data** on page 2-22
✔ Damping	1, 3, 6
Date	1, 3, 4, 1
Descriptor	1, 3, 4, 2
Digital To Analog Trim (4–20 mA Output)	1, 2, 3, 2, 1
Disable Local Span/Zero Adjustment	1, 4, 4, 1, 7
Field Device Info	1, 4, 4, 1
Full Trim	1, 2, 3, 3
Keypad Input	1, 2, 3, 1, 1
Loop Test	1, 2, 2
Lower Sensor Trim	1, 2, 3, 3, 2
Message	1, 3, 4, 3
Meter Type	1, 4, 3, 5
Number Of Requested Preambles	1, 4, 3, 4, 2
Poll Address	Left Arrow, 5, 1
✔ Range Values	1, 3, 3
Rerange	1, 2, 3, 1
Scaled D/A Trim (4–20 mA Output)	1, 2, 3, 2, 2
Self Test (Transmitter)	1, 2, 1, 1
Sensor Info	1, 4, 4, 2
Sensor Temperature	1, 1, 4
Sensor Trim Points	1, 2, 3, 3, 4
Status	1, 2, 1, 2
✔ Tag	1, 3, 1
✔ Transfer Function (Setting Output Type)	1, 3, 5
Transmitter Security (Write Protect)	1, 3, 4, 4
Trim Analog Output	1, 2, 3, 2
✔ Units (Process Variable)	1, 3, 2
Upper Sensor Trim	1, 2, 3, 3, 3
Zero Trim	1, 2, 3, 3, 1

CONNECTIONS AND HARDWARE

⚠ The HART Communicator Model 275 can interface with a transmitter from the control room, the instrument site, or any wiring termination point in the loop through the rear connection panel as shown in Figure A-3. Do not make connections to the serial port or NiCad recharger jack in an explosive atmosphere. To communicate, connect the HART Communicator in parallel with the instrument or load resistor. The connections are non-polarized. Before connecting the HART Communicator in an explosive atmosphere, make sure the instruments in the loop are installed in accordance with intrinsically safe or nonincendive field wiring practices.

NOTE
The HART Communicator needs a minimum of 250 ohms resistance in the loop to function properly.

The HART Communicator is not a measurement device and does not need to be calibrated; it is a communications device through which you can read and adjust the transmitter configuration information. All variable outputs displayed by the communicator are functions of the transmitter.

FIGURE A-3. Rear Connection Panel with Optional NiCad Recharger Pack.

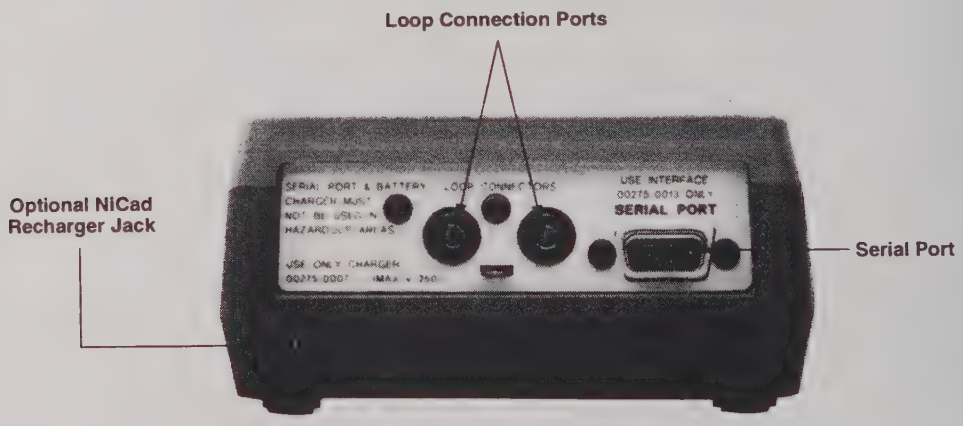
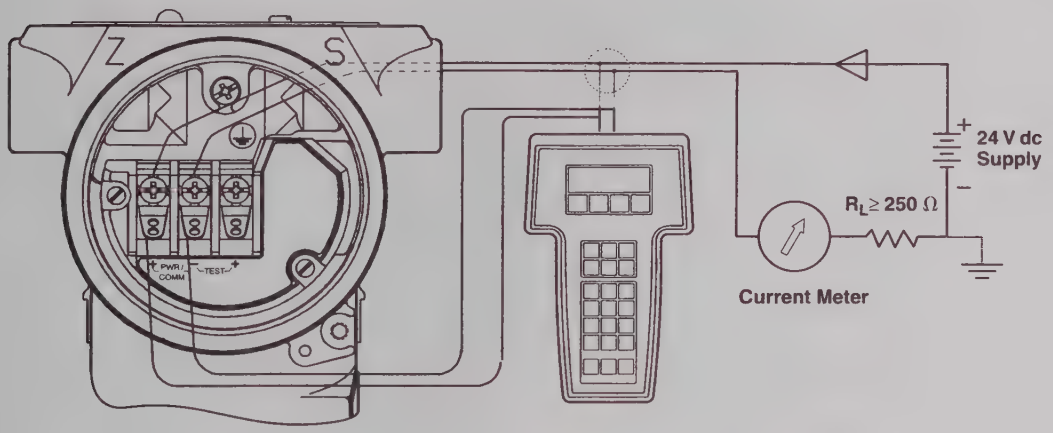
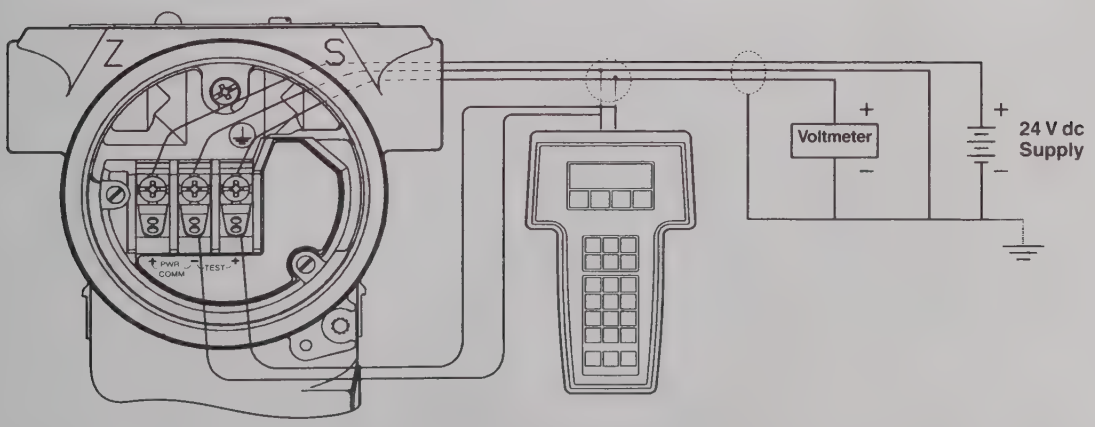


FIGURE A-4. Bench Hook-up
(4–20 mA Transmitters).



3051-3051G02B

FIGURE A-5. Bench Hook-up
(Low Power Transmitters).



3051-3031I02B

FIGURE A-6. Field Hook-up
(4–20 mA Transmitters).

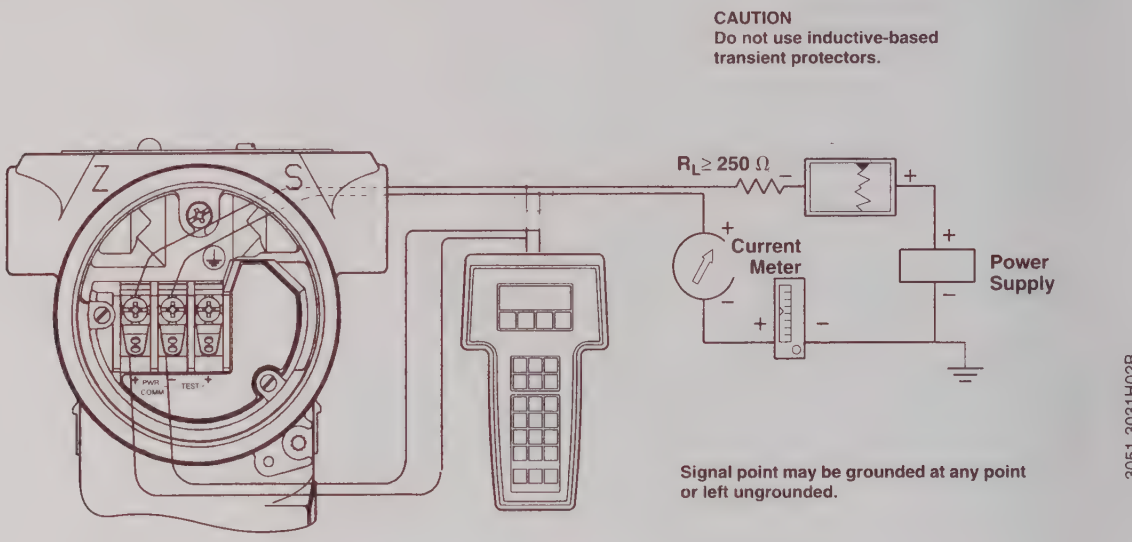
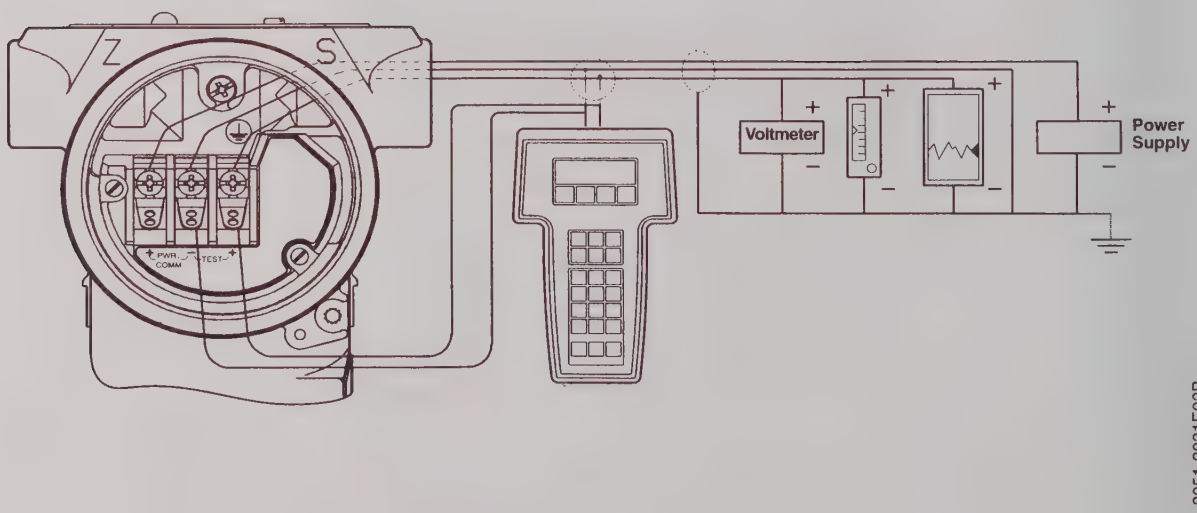


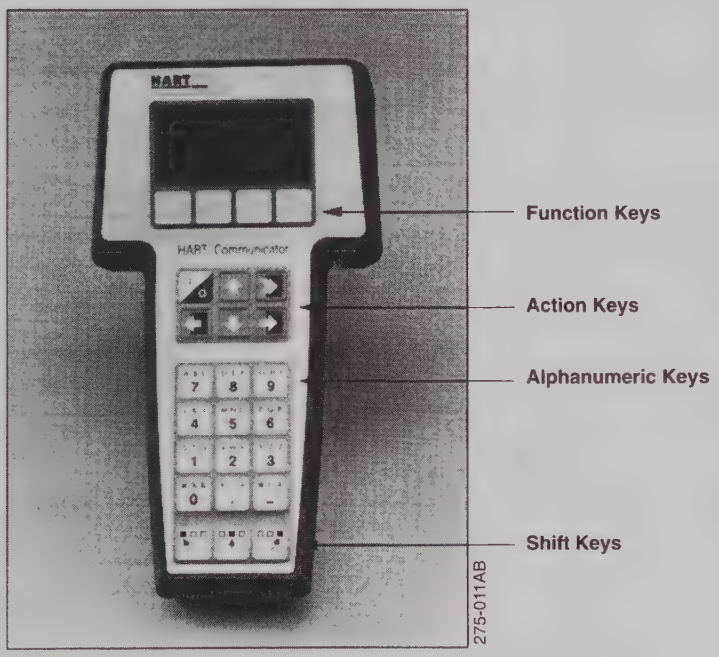
FIGURE A-7. Field Hook-up
(Low Power Transmitters).



COMMUNICATOR KEYS

The keys of the HART Commuincator include action, function, alphanumeric, and shift keys

FIGURE A-8. Model 275 HART Communicator.



Action Keys

As shown in Figure A-8, the action keys are the six blue, white, and black keys located above the alphanumeric keys. The function of each key is described as follows:

ON/OFF Key

Use this key to power the HART Communicator. When the communicator is turned on, it searches for a transmitter on the 4–20 mA loop. If a device is not found, the communicator displays the message, "No Device Found. Press OK."

If a HART-compatible device is found, the communicator displays the Online Menu with device ID and tag.

Directional Keys

Use these keys to move the cursor up, down, left, or right. The right arrow key also selects menu options, and the left arrow key returns to the previous menu.

HOT Key

Use this key to quickly access important, user-selectable options when connected to a HART-compatible device. Pressing the Hot Key turns the HART Communicator on and displays the Hot Key Menu. See Customizing the Hot Key Menu in the HART Communicator manual for more information.

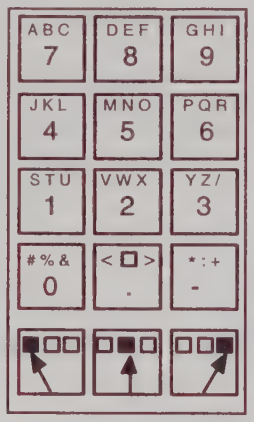
Function Keys

Use the four software-defined function keys, located below the LCD, to perform software functions. On any given menu, the label appearing above a function key indicates the function of that key for the current menu. As you move among menus, different function key labels appear over the four keys. For example, in menus providing access to on-line help, the HELP label may appear above the F1 key. In menus providing access to the Online Menu, the HOME label may appear above the F3 key. Simply press the key to activate the function. See your HART Communicator manual for details on specific function key definitions.

Alphanumeric and Shift Keys

The alphanumeric keys (Figure A-9) perform two functions: the fast selection of menu options and data entry.

FIGURE A-9. HART Communicator Alphanumeric and Shift Keys.



275-0383A

Data Entry

Some menus require data entry. Use the alphanumeric and shift keys to enter all alphanumeric information into the HART Communicator. If you press an alphanumeric key alone from within an edit menu, the bold character in the center of the key appears. These large characters include the numbers zero through nine, the decimal point (.), and the dash symbol (—).

To enter an alphabetic character, first press the shift key that corresponds to the position of the letter you want on the alphanumeric key. Then press the alphanumeric key. For example, to enter the letter R, first press the right shift key, then the "6" key (see Figure A-10). Do not press these keys simultaneously, but one after the other.

FIGURE A-10. Data Entry Key Sequence.

275-0532A, 0343A

Fast Key Sequences

HART fast key sequences provide quick on-line access to transmitter variables and functions. Instead of stepping your way through the menu structure using the action keys, you can press a HART fast key sequence to move from the Online Menu to the desired variable or function. On-screen instructions guide you through the rest of the screens.

Fast Key Sequence Conventions

The fast key sequences for the Model 275 use the following conventions for their identification:

1 through 9–Refer to the keys located directly below the dedicated keypad.

Left Arrow–Refers to the left arrow directional key.

Fast Key Sequence Example

HART fast key sequences are made up of the series of numbers corresponding to the individual options in each step of the menu structure. For example, from the Online Menu you can change the **Date**. Following the menu structure, press 1 to reach **Device Setup**, press 3 for **Basic Setup**, press 4 for **Device Info**, press 5 for **Date**. The corresponding HART fast key sequence is 1,3,4,5.

HART fast keys are operational only from the Online Menu. If you use them consistently, you will need to return to the Online Menu by pressing HOME (F3) when it is available. If you do not start at the Online Menu, the HART fast key sequences will not function properly.

Use Table A-1, an alphabetical listing of every on-line function, to find the corresponding HART fast key sequences. These codes are applicable only to Model 3051 transmitters and the HART Communicator.

MENUS AND FUNCTIONS

The HART Communicator is a menu driven system. Each screen provides a menu of options that can be selected as outlined above, or provides direction for input of data, warnings, messages, or other instructions.

Main Menu

When the HART Communicator is turned on, one of two menus will appear. If the HART Communicator is connected to an operating loop, the communicator will find the device and display the Online Menu (see below). If it is not connected to a loop, the communicator will indicate that no device was found. When you press OK (F4), it will display the Main menu.

The Main menu provides the following options:

- *Offline*–The Offline option provides access to offline configuration data and simulation functions.
- *Online*–The Online option checks for a device and if it finds one, brings up the Online Menu.
- *Transfer*–The Transfer option provides access to options for transferring data either from the HART Communicator (memory) to the transmitter (device) or vice versa. Transfer is used to move off-line data from the HART Communicator to the transmitter, or to retrieve data from a transmitter for off-line revision.

NOTE
Online communication with the transmitter automatically loads the current transmitter data to the HART Communicator. Changes in on-line data are made active by pressing SEND (F2). The transfer function is used only for off-line data retrieval and sending.

- *Frequency Device*–The Frequency Device option displays the frequency output and corresponding pressure output of current-to-pressure transmitters.
- *Utility*–The Utility option provides access to the contrast control for the HART Communicator LCD screen and to the autopoll setting used in multidrop applications.

Once selecting a Main menu option, the HART Communicator provides the information you need to complete the operation. If further details are required, consult the HART Communicator manual.

Online Menu

The Online Menu can be selected from the Main menu as outlined above, or it may appear automatically if the HART Communicator is connected to an active loop and can detect an operating transmitter.

NOTE
The Main menu can be accessed from the Online Menu. Press the left arrow action key to deactivate the on-line communication with the transmitter and to activate the Main menu options.

When configuration variables are reset in the on-line mode, the new settings are not activated until the data is sent to the transmitter. Press SEND (F2) when it is activated to update the process variables of the transmitter.

On-line mode is used for direct evaluation of a particular meter, re-configuration, changing parameters, maintenance, and other functions.

Diagnostic Messages

The following pages contain a list of messages used by the HART Communicator (HC) and their corresponding descriptions.

Variable parameters within the text of a message are indicated with *<variable parameter>*.

Reference to the name of another message is identified by *[another message]*.

Message	Description
1k snsr EEPROM error-factory ON	Replace the sensor module
1k snsr EEPROM error-user-no out ON	Use the HART communicator to reset the following parameters: remote seal isolator, remote seal fill fluid, flange material, o-ring material, transmitter type, remote seal type, flange type, meter type, number of remote seals.
1k snsr EEPROM error-user ON	Perform a full trim to recalibrate the transmitter.
4k micro EEPROM error-factory ON	Replace the electronics board.
4k micro EEPROM error-user-no out ON	Use the hart communicator to reset the message field.
4k micro EEPROM error-user ON	Use the HART communicator to reset the following parameters: units, range values, damping, analog output, transfer function, tag, scaled meter values. Perform a d/a trim to ensure that the error is corrected.
4k snsr EEPROM error-factory ON	Replace the sensor module.
4k snsr EEPROM error-user ON	Use the HART communicator to reset the temperature units and the calibration type.
Add item for ALL device types or only for this ONE device type.	Asks the user whether the hot key item being added should be added for all device types or only for the type of device that is connected.
Command Not Implemented	The connected device does not support this function.
Communication Error	The communicator and the device are not communicating correctly. Check all connections between the communicator and the device and resend the information.
Configuration memory not compatible with connected device	The configuration stored in memory is incompatible with the device to which a transfer has been requested.
CPU board not initialized ON	The electronics board is not initialized. Replace the electronics board.
CPU EEPROM write failure ON	Message sent to electronics board from HART signal failed. Replace the electronics board.
Device Busy	The connected device is busy performing another task.
Device Disconnected	The device failed to respond to a command. Check all connections between the communicator and the device and resend the command.
Device write protected	Device is in write-protect mode. Data can not be written.
Device write protected. Do you still want to shut off?	Device is in write-protect mode. Press YES to turn the HART communicator off and lose the unsent data.
Display value of variable on hotkey menu?	Asks whether the value of the variable should be displayed adjacent to its label on the hotkey menu if the item being added to the hotkey menu is a variable.

Message	Description
Download data from configuration memory to device	Press the SEND softkey to transfer information from the communicator memory to the device.
Exceed field width	Indicates that the field width for the current arithmetic variable exceeds the device-specified description edit format.
Exceed precision	Indicates that the precision for the current arithmetic variable exceeds the device-specified description edit format.
Ignore next 50 occurrences of status?	Select YES to ignore the next 50 occurrences of device status, or select no to display every occurrence.
Illegal character	An invalid character for the variable type was entered.
Illegal date	The day portion of the date is invalid.
Illegal month	The month portion of the date is invalid.
Illegal year	The year portion of the date is invalid.
Incompatible CPU board and module ON	Upgrade the electronics board or the sensor module to the current revision.
Incomplete exponent	The exponent of a scientific notation floating point variable is incomplete.
Incomplete field	The value entered is not complete for the variable type.
Looking for a device	Polling for multidropped devices at addresses 1–15.
Local buttons operator error ON	Illegal pressure applied during zero or span operation. Repeat the process after verifying the correct pressures.
Mark as read only variable on hotkey menu?	Asks whether the user should be allowed to edit the variable from the hotkey menu if the item being added to the hotkey menu is a variable.
Module EEPROM write failure ON	Message sent to the module from the HART signal failed. Replace the sensor module.
No device configuration in configuration memory	There is no configuration saved in memory available to re-configure off-line or transfer to a device.
No Device Found	Poll of address zero fails to find a device, or poll of all addresses fails to find a device if auto-poll is enabled.
No hotkey menu available for this device.	There is no menu named "hotkey" defined in the device description for this device.
No pressure updates ON	No pressure updates being received from the sensor module. Verify that the sensor module ribbon cable is attached correctly. Or replace the sensor module.
No offline devices available.	There are no device descriptions available to be used to configure a device offline.
No simulation devices available.	There are no device descriptions available to simulate a device.
No temperature updates ON	No temperature updates being received from the sensor module. Verify that the sensor module ribbon cable is attached correctly. Or replace the sensor module.
No UPLOAD_VARIABLES in ddl for this device	There is no menu named "upload_variables" defined in the device description for this device. This menu is required for offline configuration.
No Valid Items	The selected menu or edit display contains no valid items.
OFF KEY DISABLED	Appears when the user attempts to turn the HC off before sending modified data or before completing a method.
Online device disconnected with unsent data. RETRY or OK to lose data.	There is unsent data for a previously connected device. Press RETRY to send data, or press OK to disconnect and lose unsent data.

Message	Description
Out of memory for hotkey configuration. Delete unnecessary items.	There is no more memory available to store additional hotkey items. Unnecessary items should be deleted to make space available.
Overwrite existing configuration memory	Requests permission to overwrite existing configuration either by a device-to-memory transfer or by an offline configuration. User answers using the softkeys.
Press OK...	Press the OK softkey. This message usually appears after an error message from the application or as a result of HART communications.
Restore device value?	The edited value that was sent to a device was not properly implemented. Restoring the device value returns the variable to its original value.
ROM checksum error ON	Checksum of transmitter software has detected a fault. Replace the electronics board.
Save data from device to configuration memory	Prompts user to press SAVE softkey to initiate a device-to-memory transfer.
Saving data to configuration memory.	Data is being transferred from a device to configuration memory.
Sending data to device.	Data is being transferred from configuration memory to a device.
Sensor board not initialized ON	The sensor module electronics board is not initialized. Replace the sensor module.
There are write only variables which have not been edited. Please edit them.	There are write-only variables which have not been set by the user. These variables should be set or invalid values may be sent to the device.
There is unsent data. Send it before shutting off?	Press YES to send unsent data and turn the HC off. Press NO to turn the HC off and lose the unsent data.
Too few data bytes received	Command returns fewer data bytes than expected as determined by the device description.
Transmitter Fault	Device returns a command response indicating a fault with the connected device.
Units for <variable label> has changed. Unit must be sent before editing, or invalid data will be sent.	The engineering units for this variable have been edited. Send engineering units to the device before editing this variable.
Unsent data to online device. SEND or LOSE data	There is unsent data for a previously connected device which must be sent or thrown away before connecting to another device.
Upgrade 275 software to access XMTR function. Continue with old description?	The communicator does not contain the most recent Model 3051 Device Descriptors (DDs). Select YES to communicate using the existing DDs. Select NO to abort communication.
Use up/down arrows to change contrast. Press DONE when done.	Gives direction to change the contrast of the HC display.
Value out of range	The user-entered value is either not within the range for the given type and size of variable or not within the min/max specified by the device.
<message> occurred reading/writing <variable label>	Either a read/write command indicates too few data bytes received, transmitter fault, invalid response code, invalid response command, invalid reply data field, or failed pre- or post-read method; or a response code of any class other than SUCCESS is returned reading a particular variable.
<variable label> has an unknown value. Unit must be sent before editing, or invalid data will be sent.	A variable related to this variable has been edited. Send related variable to the device before editing this variable.

Appendix B Model 268 Communicator

INTRODUCTION

This appendix provides basic communicator information on the Rosemount Model 268 SMART FAMILY Interface when used with a Model 3051 Smart Pressure Transmitter.

NOTE
All additional features of the Model 3051 are only accessible by using a HART Communicator Model 275. The Model 268 SMART FAMILY Interface will only provide features accessible with the existing Model 3051 Device Descriptors (DDs) present in the Model 268. For full functionality, use a Model 275 Communicator. Contact your nearest Rosemount Service Center or Sales Representative for details.

SAFETY MESSAGES

Procedures and instructions in this section may require special precautions to ensure the safety of the personnel performing the operations. Information that raises potential safety issues is indicated by a warning symbol (⚠). Refer to the following safety messages before performing an operation preceded by this symbol.

Warnings (⚠)

⚠WARNING

Explosions can result in death or serious injury.

- Do not remove the transmitter covers in explosive environments when the circuit is alive.
- Both transmitter covers must be fully engaged to meet explosion-proof requirements.
- Before connecting a communicator in an explosive atmosphere, make sure the instruments in the loop are installed in accordance with intrinsically safe or nonincendive field wiring practices.

FIGURE B-1. 268 Menu Tree

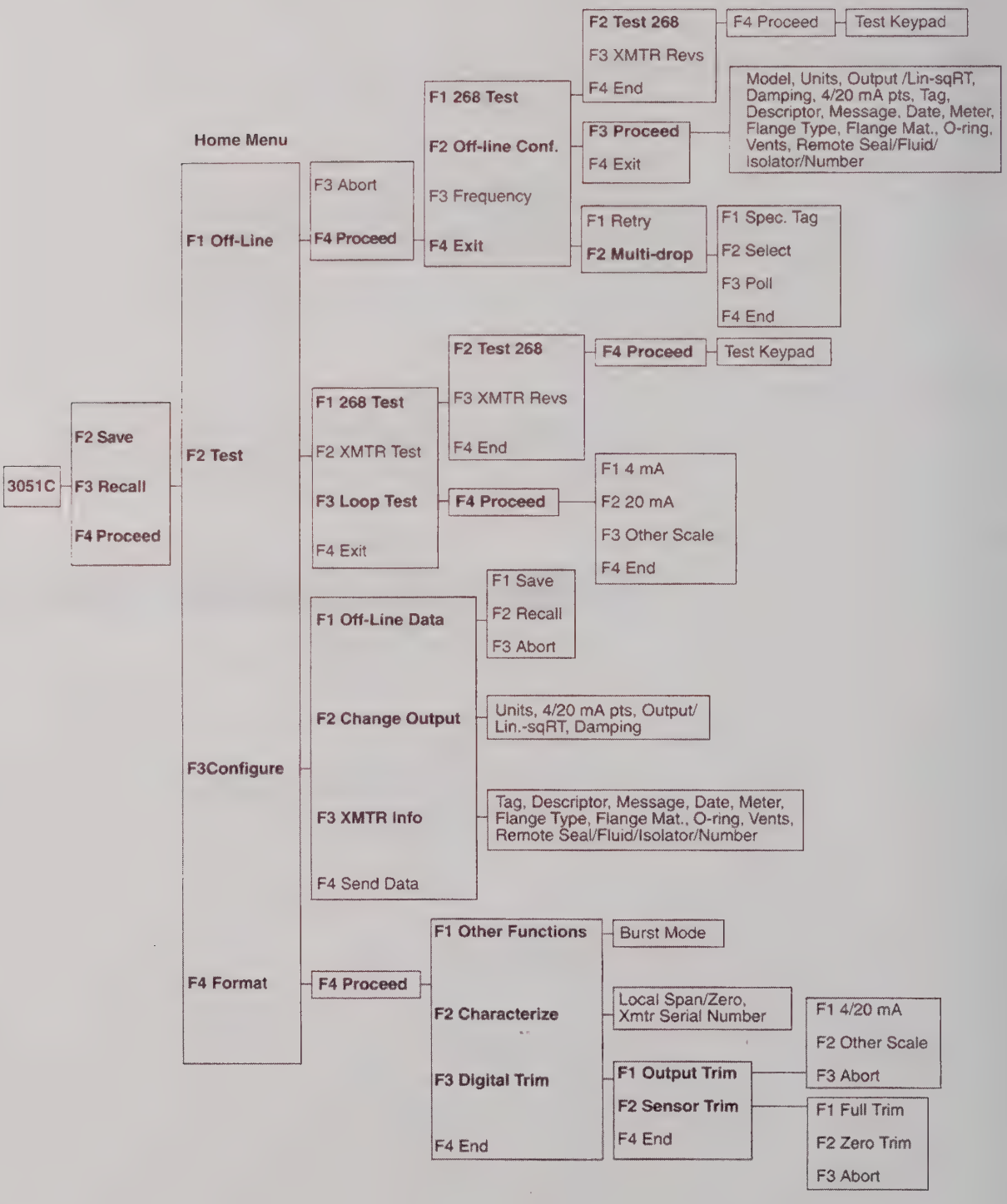


TABLE B-1. Model 268 Fast Key Equivalents

Function	Model 268 Fast Key Sequences
Analog Output	F3, F2
Analog Output Alarm	Not Applicable
Burst Mode Control	F4, F4, F1
Burst Operation	Not Applicable
Calibration	Not Applicable
Clone Data	F4, F4, F1
Damping	F3, F2, (F1 x 3)
Date	F3, F3, (F1 x 3)
Descriptor	F3, F3, F1
Digital To Analog Trim (4–20 mA Output)	F4, F4, F3
Disable Local Span/Zero Adjustment	F4, F4, F2
Field Device Info	F3, F3
Full Trim	F4, F4, F3, F2, F1
Keypad Input (Trim Points)	F3, F2, F1
Loop Test	F2, F3
Lower Range Value	Process Variable Key, F2
Lower Sensor Trim	F4, F4, F3, F2, F1, F2
Message	F3, F3, F1, F1
Meter Type	F3, F3, (F1 x 4)
Number Of Requested Preambles	Not Applicable
Percent Range	Not Applicable
Poll Address	F1, F4, F4, F2, F3
Pressure	Process Variable Key
Range Values	F3, F2, F1
Rerange	F4, F4, F3, F1, F1
Scaled D/A Trim (4–20 mA Output)	F4, F4, F3, F1, F2
Self Test (Transmitter)	F2, F2
Sensor Info	F3, F3
Sensor Temperature	Process Variable Key, F3
Sensor Trim Points	F3, F2, F1
Status	Not Applicable
Tag	F3, F3
Transfer Function (Setting Output Type)	F3, F2, F1, F1
Transmitter Security (Write Protect)	Not Applicable
Trim Analog Output	F4, F4, F3, F1
Units (Process Variable)	F3, F2
Upper Range Value	Process Variable Key, F2
Upper Sensor Trim	F4, F4, F3, F2, F1, F3
Zero Trim	F4, F4, F3, F2, F2

CONNECTIONS AND HARDWARE

The Model 268 can communicate with a transmitter from the control room, the transmitter site, or any other wiring termination point in the loop. To communicate, it must be connected in parallel with the transmitter; the connections are non-polarized.

FIGURE B-2. Bench Hook-up (4–20 mA Transmitters).

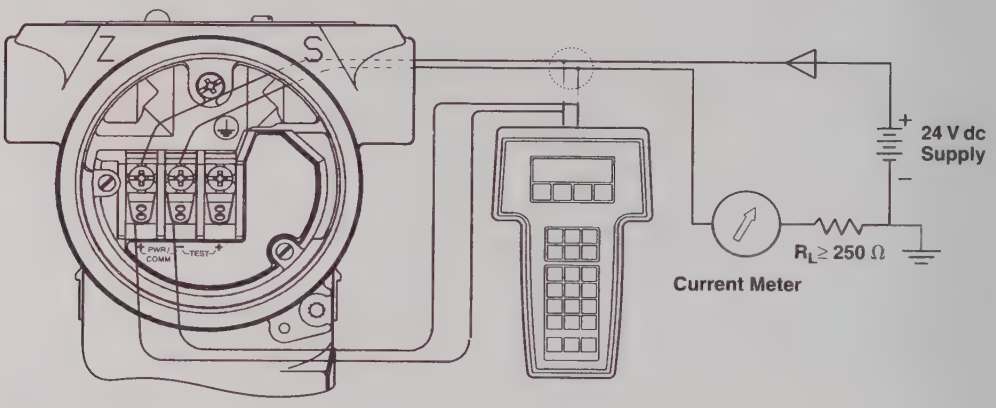


FIGURE B-3. Bench Hook-up (Low Power Transmitters).

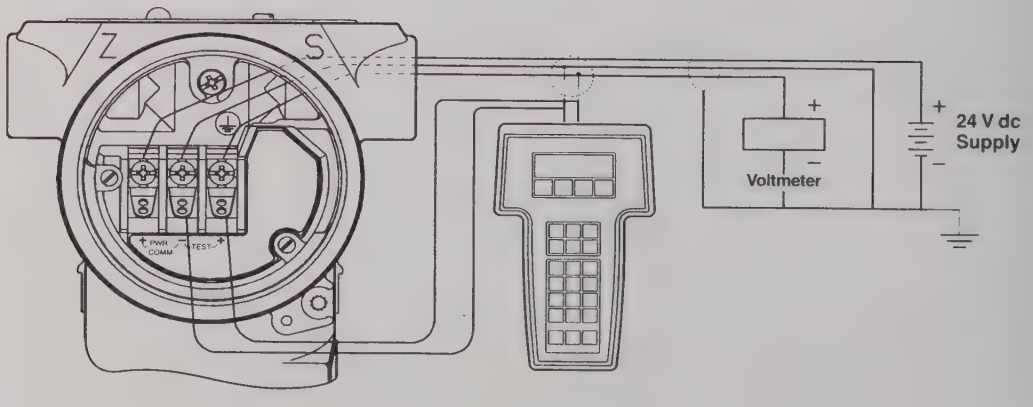


FIGURE B-4. Field Hook-up
(4–20 mA Transmitters).

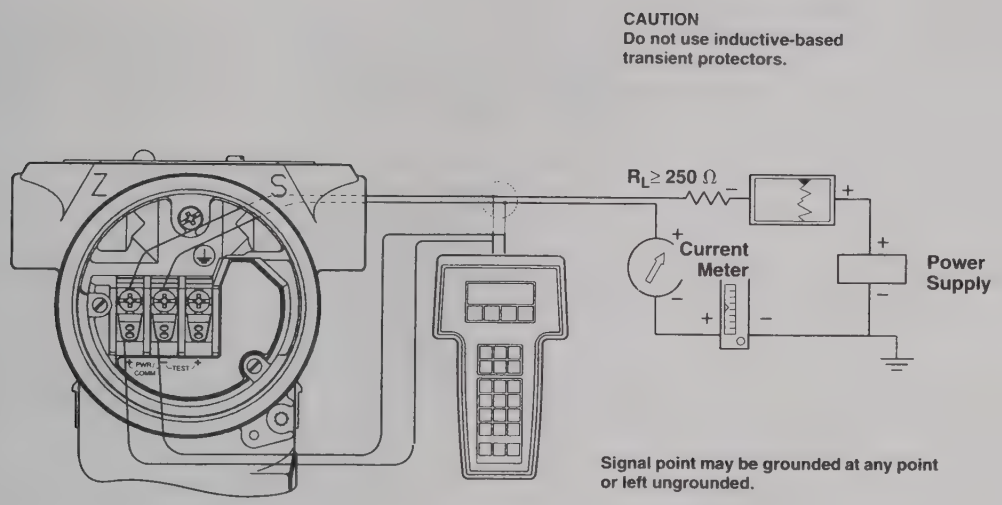
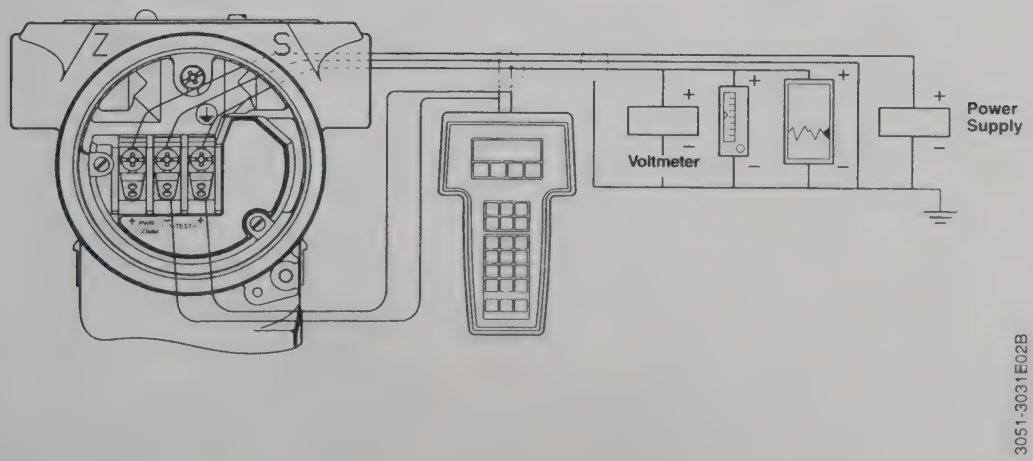


FIGURE B-5. Field Hook-up
(Low Power Transmitters).



COMMUNICATOR KEYS

The keys of the Model 268 include the alphanumeric, dedicated, and function keys that vary depending on the task being performed. The dedicated key functions are always the same.

Dedicated Keys

On/Off

Use this key to turn the unit on and off. When the Model 268 is turned ON, it searches for a transmitter in the 4–20 mA loop. If no transmitter is found, the Model 268 offers the opportunity to try again, select "MULT DROP" or "OFF-LINE".

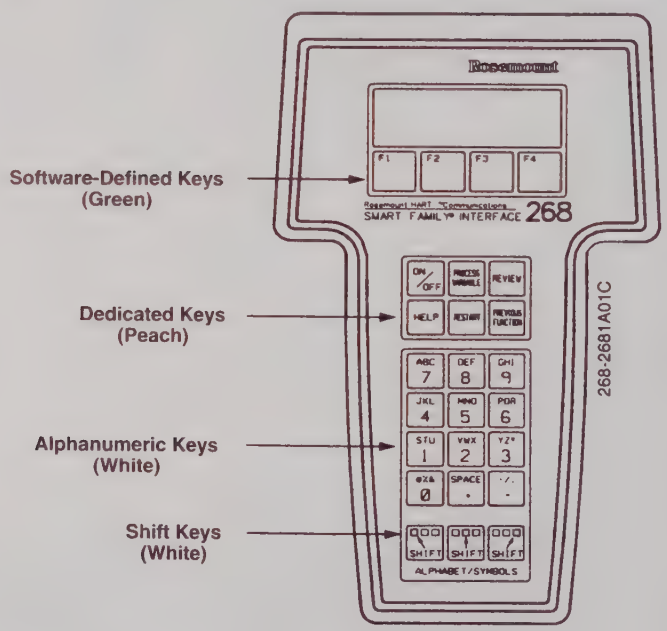
Process Variable

Use the Process Variable key to display up-to-date process variable readings from the transmitter in engineering units, milliamps, pulse rate, and shedding rate. It also displays totalized flow.

Review

The Review key allows you to step through all the information currently held in the four memory locations of the transmitter and Model 268 — SAFE MEM, OFLN MEM, WORK REG, and XMTR MEM.

FIGURE B-6. Model 268 Communicator.



Help

Use the Help key to explain the software-defined key functions (F1-F4) in detail.

Restart

Use the Restart key to initiate communication with a transmitter while the Model 268 is still turned on. Upon connection to a new transmitter, pressing this key loads information from the new transmitter into the Model 268 working register.

Previous Function

The Previous Function key returns you to the previous decision level and allows you to select a different software-defined key function.

Alphanumeric and Shift Keys

Some menus require data entry. Use the alphanumeric and shift keys to enter all alphanumeric information into the Model 268.

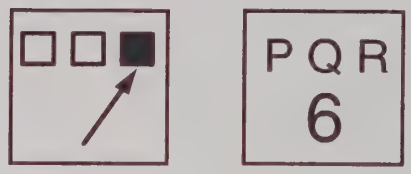
275-0383A

FIGURE B-7. Model 268 Communicator Alphanumeric and Shift Keys.

If you press an alphanumeric key alone from within an edit menu, the bold character in the center of the key appears. These characters include the numbers zero through nine, the decimal point (.), and the dash symbol (–).

To enter an alphabetic character, first press the shift key that corresponds to the position of the letter you want on the alphanumeric key. Then press the alphanumeric key. For example, to enter the letter R, first press the right shift key, then the "6" key (see Figure B-8). Do not press these keys simultaneously, but one after the other.

FIGURE B-8. Data Entry Key Sequence.



275-0352A, 0343A

Function Keys

Use the four software-defined function keys, located below the LCD, to perform software functions. On any given menu, the label appearing above a function key indicates the function of that key for the current menu. As you move among menus, different function key labels appear over the four keys.

Fast Key Sequences

The Model 268 fast key sequences provide quick on-line access to transmitter variables and functions. Instead of stepping your way through the menu structure, you can press a fast key sequence to move from the Home Menu to the desired variable or function. On-screen instructions guide you through the rest of the screens.

Fast Key Sequence Conventions

The fast key sequences for the Model 268 use the following conventions for their identification:

F1, F2, F3, F4–Refer to each function key located directly below the LCD on the Model 268.

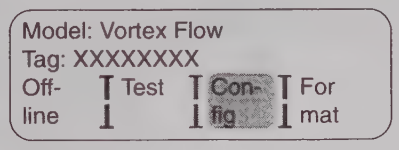
(F2 x 7)–Means to push the F2 key seven consecutive times.

Process Variable–Refers to the dedicated key located below the function keys on the Model 268.

To return to the Home Menu, use the function keys to exit the current task and press the PREVIOUS FUNCTION (dedicated key) as many times as necessary.

The fast key sequences are applicable only from the Home Menu. The Home Menu lists the model and tag, and labels the four function keys Offline, Test, Configure and Format (see Figure B-9). After completing a task, return to the Home Menu if you intend to use the fast key sequences. Fast key sequences will not work from any other Model 268 screen.

FIGURE B-9. Model 268 Home Screen.



To return to the Home Menu, use the function keys to exit the current task and press PREVIOUS FUNCTION as many times as necessary. When the Home Menu appears, you can use another fast key sequence to reach a desired task.

NOTE
In order to complete certain tasks, you must first set the loop to manual control. Fast key sequence steps often include the warning to return the loop to manual. If the loop is not in manual control, be sure to watch for this screen. If it comes up during the fast key sequence, set the loop to manual before continuing with the task.

Fast Key Sequence Example

Date

To change the Date following the menu structure, you would start at the Home Menu and press F3 for **Configure,** F3 for **Xmtr Info,** and F1 three times in a row to reach the Date function. The fast key sequence is F3, F3, (F1 x 3).

Diagnostic Messages

The following table provides a guide to diagnostic messages of the Model 268.

Message	Description
CAUTION–Progressing will clear Ofln Mem	OFLN Memory is cleared for new information.
Data saved in OFLN Mem for downloading	Off-line configuration data are saved in the Off-line Memory and can be downloaded or sent to the flowmeter at an appropriate time.
Different XMTR type connected–XMTR Mem not changed	Flowmeter did not accept data sent because the data is meant for a different type of transmitter.
ERR–Filter Auto Adj	The low pass filter auto-adjust sequence error occurs under the following conditions: • no flow in pipe • filter tracking disabled Remedy conditions and repeat function.
ERR–Not xmtr command	Flowmeter does not understand the command sent by the Model 268. Press F4, RESTART to restart the flowmeter, or press F3 to suppress the error message ad REVIEW the software revision level. You may need to contact the Rosemount Service Center.
ERR–Xmtr will not support command	The flowmeter does not understand the Model 268 command. Press F4, RESTART or press F3, REVIEW to review the software revision level of the flowmeter. Check compatibility.
Errors Detected–XMTR Mem not changed	Flowmeter did not accept data because it contained nonpermissible values. Data errors must be corrected and the data sent again.
Making changes permanent–PLEASE WAIT	Data is being sent to flowmeter and flowmeter is accepting the data.
No data modified to send	Data with no changes is being sent. Press F4 to continue.
No data saved in OFLN Mem	There are no data in the Off-line Memory to review.
No data saved in SAFE Mem	There are no data in the Safe Memory to review.
Ofln Mem not compatible with WORK REGS–Data not transferred	The data stored in Off-line Memory and WOrking Register are from different kinds of transmitters, or the Off-line Memory is empty. Press F4, REVIEW, F2 to see the data in Off-line Memory and connect the Model 268 to similar transmitter.
SAFE Mem from diff Xmtr than WORK REGS–Data not transferred	Data in the Safe Memory and Working Register are from different transmitters. Press F4, REVIEW, F1 and find the flowmeter serial number. Connect the Model 268 to the flowmeter with that serial number and press RESTART.
SAFE Mem not compatible with WORK REGS–Data not transferred	The unique identifier in the Safe Memory and the transmitter are different. Press F4, REVIEW, F1 to see the data in the Safe Memory. Connect the Model 268 to the matching transmitter and press RESTART.
WARN–Used nearest legal table value	The value entered has too many decimal places. The Model 8800 defaults to the closest value available.
WARN–Value entered is illegal, re-enter	The Model 268 will not accept the entered value. Enter an acceptable value (see relevant section in manual).
WARN–Value out of limits, altered by 268, re-check data	The Model 268 could not store the entered value so it changed to the maximum allowable value. Check the new value.
WARNING–Control loop should be in manual	Before sending the data that could affect the 4–20 mA output signal, set the loop to manual control. After it is set, press F4.

Message	Description
WARNING–Data transmission error	Previous communication between Model 268 and the flowmeter was not successful. If this message appears repeatedly, check the loop for a source of noise that could corrupt the signal.
WARNING–Loop may be returned to auto	After completing a communication that required the loop to be set in manual, you may return the loop to automatic control.
WARNING–Match xmtr S/N to nameplate S/N	Check to be sure that the entered flowmeter serial number is the same as that on the flowmeter nameplate.
WARNING–Not on line	The key you have pressed is not applicable for off-line configuration tasks.
WARNING–Process has been aborted	Indicates that the self-test has been aborted by pressing any key.
WARNING–Some of the changes were not saved in the xmtr mem	Flowmeter did not receive all configuration changes. Note differences in configuration data and reconfigure the flowmeter accordingly.
WARNING–This address already being used	Another transmitter is already using the entered multi-drop address. Enter a new address.
WARNING–This will erase work reg	Data in the Working Register will be replaced with data from a another location.
WARNING–Xmtr/268 not in communication	Model 268 did not get answer from flowmeter: • Check connections • Check that power is reaching flowmeter • Check for minimum 250 ohms resistance in loop
WARNING–Xmtr in output mode	During start-up and restart, the transmitter milliamp output does not reflect the process variable. Press F4.
WARNING–Xmtr is not communicating	Model 268 did not get answer from flowmeter: • Check connections • Check that power is reaching flowmeter • Check for minimum 250 ohms resistance in loop
WARNING–268 does not know this Xmtr	Model 268 recognizes a Rosemount transmitter in the loop but cannot communicate with it. The message usually indicates a software revision level incompatibility between the Model 268 and the transmitter.
XMTR Mem diff than WORK Regs–XMTR not changed	Data in the Working Register and in the flowmeter have different unique identifiers. The Model 268 was probably connected to different flowmeter without RESTART or power-off/power-on sequence. Press RESTART to erase the Working Register or save the Working Register to the Off-line Memory and download to the proper flowmeter at a later time.
Xmtr still busy	Flowmeter is running a computational or diagnostic routine and cannot respond to the Model 268 instructions. Press the PREVIOUS FUNCTION key to cancel.

Appendix C Approval Drawings

OVERVIEW

Index of intrinsically safe Factory Mutual barrier systems and entity parameters for Models 3051C/L/P/H/T and 3001C/S (Drawing Number 03031-1019, Rev J), pages C-2 through C-7.

Index of intrinsically safe C.S.A. barrier systems for Models 3051C/L/P/H/T and 3001C/S (Drawing Number 03031-1024, Rev G), pages C-8 through C-10.

Index of intrinsically safe barrier systems and entity parameters for the Model 268 SMART FAMILY Interface (Drawing Number 00268-0031, Rev M), pages C-11 through C-17.

PROPRIETARY INFORMATION IS CONTAINED HEREIN AND MUST BE HANDLED ACCORDINGLY

DATE

REVISION

REV	DESCRIPTION	CHG. NO.	APP'D	DATE
C	ADD 3001C, CHG SYSTEM TO ENTITY	629811	K.M.O.	06/02/89
D	ADD 3051CA	634110	K.C.	03/13/90
E	ADD MORE MODELS	636894	G.M.	8/31/90
F	ADD TRANS.PROTECTION INFO & 3001S	639236	G.E.M.	2/7/91
G	MODIFY Imax FOR T1 OPTION;CHG ENTITY CONCEPT DESCRIPT.SHT 4	641843	G.E.M.	6/5/91
H	ADD SHT 5 & 6 FOR LOW POWER CONFIGURATION	642380	G.E.M.	8/13/91
J	ADD 3051T	664828	G.E.M.	3/15/95

ENTITY APPROVALS FOR

3051C	3001C
3051L	3001CL
3051P	3001CH
3051H	3001S
3051CA	3001SL
3051T	3001SH

(INCLUDES LOW POWER CONFIGURATIONS)

SEE SHEET 5

THE ROSEMOUNT TRANSMITTERS LISTED ABOVE ARE F.M. APPROVED AS INTRINSICALLY SAFE WHEN USED IN CIRCUIT WITH F.M. APPROVED BARRIERS WHICH MEET THE ENTITY PARAMETERS LISTED IN THE CLASS I, II, AND III, DIVISION 1 GROUPS INDICATED, TEMP CODE T4. ADDITIONALLY, THE ROSEMOUNT 333 FIELD SIGNAL INDICATOR IS F.M. APPROVED AS INTRINSICALLY SAFE WHEN CONNECTED IN CIRCUIT WITH ROSEMOUNT TRANSMITTERS (FROM ABOVE) AND F.M. APPROVED BARRIERS WHICH MEET THE ENTITY PARAMETERS LISTED FOR CLASS I, II, AND III, DIVISION 1, GROUPS INDICATED, TEMP CODE T4.

TO ASSURE AN INTRINSICALLY SAFE SYSTEM, THE TRANSMITTER AND BARRIER MUST BE WIRED IN ACCORDANCE WITH THE BARRIER MANUFACTURER'S FIELD WIRING INSTRUCTIONS AND THE APPLICABLE CIRCUIT DIAGRAM INDICATED ON SHEET 3.

THIS DRAWING WAS CREATED ON CAD. DRAWING IS ARCHIVED ON MAGNETIC TAPE FOR ECO CHANGES.

UNLESS OTHERWISE SPECIFIED DIMENSIONS IN INCHES. REMOVE ALL BURRS AND SHARP EDGES. MACHINE SURFACE FINISH 125

DO NOT SCALE PRINT

CONTRACT NO.

APP'D. GOVT.

DR. MIKE DOBE 03/21/89

KELLY ORTH

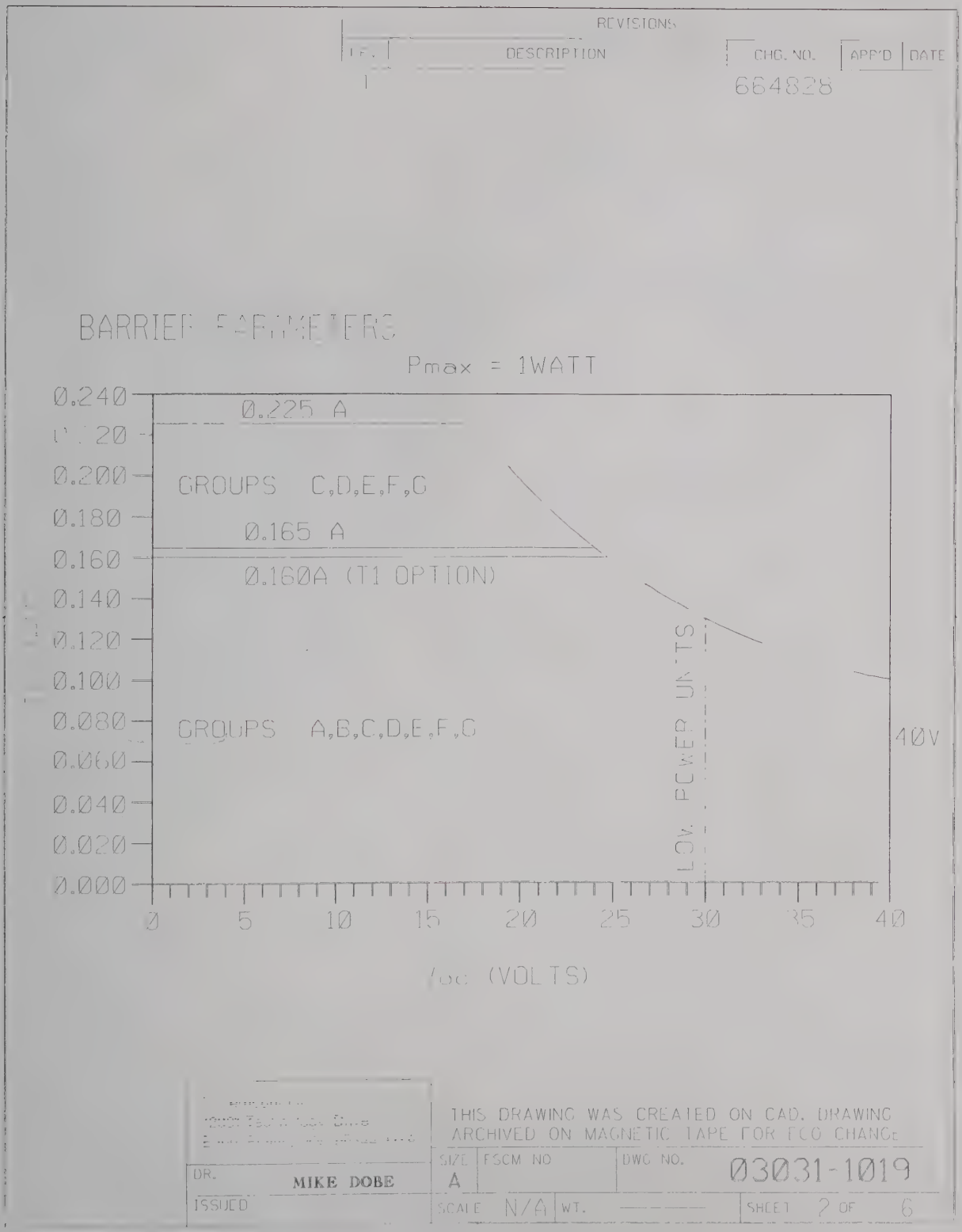
Rosemount Measurement Control Analytical Values

Rosemount Inc.
12001 Technology Drive
Eden Prairie, MN 55344 USA

TITLE
INDEX OF I.S. F.M. FOR 3051C/L/P/H/T & 3001C/S

SIZE A | FSCM NO | DWG NO. 03031-1019

SCALE N/A | WT. | SHEET 1 OF 6


REVISIONS
LTR
DESCRIPTION
CHG. NO.
APP'D
DATE
664828
BARRIER PARAMETERS
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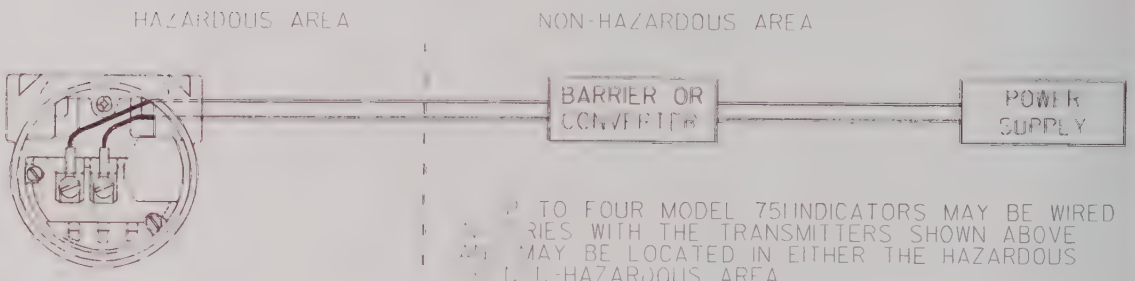
0.200
0.180
0.160
0.140
0.120
0.100
0.080
0.060
0.040
0.020
0.000
0.225 A
GROUPS C,D,E,F,G
0.165 A
0.160A (T1 OPTION)
GROUPS A,B,C,D,E,F,G
LOW POWER UNITS
40V
0
5
10
15
20
25
30
35
40
Voc (VOLTS)
THIS DRAWING WAS CREATED ON CAD. DRAWING
ARCHIVED ON MAGNETIC TAPE FOR ECO CHANGE
DR.
MIKE DOBE
ISSUED
SIZE
A
FSCM NO
DWG NO.
03031-1019
SCALE N/A
WT.
SHEET 2 OF 6

REVISIONS				
REV	DESCRIPTION	CHG. NO.	APP'D	DATE
	664828			

CIRCUIT DIAGRAM 1
ONE BARRIER OR CONVERTER:
SINGLE OR DUAL CHANNEL

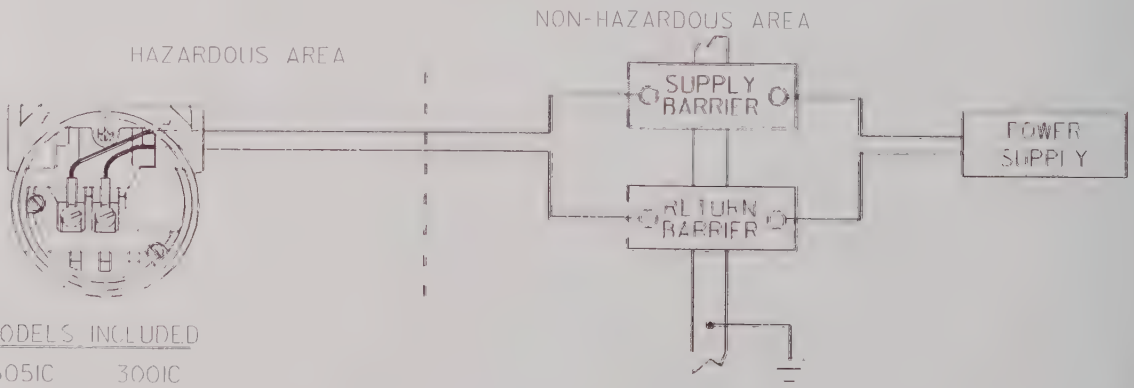


UP TO FOUR MODEL 751 INDICATORS MAY BE WIRED IN SERIES WITH THE TRANSMITTERS SHOWN ABOVE AND MAY BE LOCATED IN EITHER THE HAZARDOUS OR NON-HAZARDOUS AREA.

MODELS INCLUDED

3051C	3001C
3051L	3001CL
3051P	3001CH
3051H	3001S
3051CA	3001SL
3051T	3001SH

CIRCUIT DIAGRAM 2
SUPPLY AND RETURN BARRIERS
(ONLY FOR USE WITH BARRIERS APPROVED IN THIS CONFIGURATION)



UP TO FOUR MODEL 751 INDICATORS MAY BE WIRED IN SERIES WITH THE TRANSMITTERS SHOWN ABOVE AND MAY BE LOCATED IN EITHER THE HAZARDOUS OR NON-HAZARDOUS AREA.

MODELS INCLUDED

3051C	3001C
3051L	3001CL
3051P	3001CH
3051H	3001S
3051CA	3001SL
3051T	3001SH

THIS DRAWING WAS CREATED ON CAD. DRAWING IS ARCHIVED ON MAGNETIC TAPE FOR ECO CHANGES.

DR.	SIZE	FSCM NO	DWG NO.	
MIKE DOBE	A		03031-1019	
ISSUED	SCALE N/A	WT.	SHEET 3 OF 6	

REVISIONS				
REV	DESCRIPTION	CHG. NO.	APP'D	DATE
J		664828		

ENTITY CONCEPT APPROVALS

THE ENTITY CONCEPT ALLOWS INTERCONNECTION OF INTRINSICALLY SAFE APPARATUS TO ASSOCIATED APPARATUS NOT SPECIFICALLY EXAMINED IN COMBINATION AS A SYSTEM. THE APPROVED VALUES OF MAX. OPEN CIRCUIT VOLTAGE (Voc OR Vt) AND MAX. SHORT CIRCUIT CURRENT (Isc OR It) AND MAX.POWER (Voc X Isc/4) OR (Vt X It/4), FOR THE ASSOCIATED APPARATUS MUST BE LESS THAN OR EQUAL TO THE MAXIMUM SAFE INPUT VOLTAGE (Vmax), MAXIMUM SAFE INPUT CURRENT (Imax), AND MAXIMUM SAFE INPJT POWER (Pmax) OF THE INTRINSICALLY SAFE APPARATUS. IN ADDITION, THE APPROVED MAX. ALLOWABLE CONNECTED CAPACITANCE (Ca) OF THE ASSOCIATED APPARATUS MUST BE GREATER THAN THE SUM OF THE INTERCONNECTING CABLE CAPACITANCE AND THE UNPROTECTED INTERNAL CAPACITANCE (C_i) OF THE INTRINSICALLY SAFE APPARATUS, AND THE APPROVED MAX. ALLOWABLE CONNECTED INDUCTANCE (La) OF THE ASSOCIATED APPARATUS MUST BE GREATER THAN THE SUM OF THE INTERCONNECTING CABLE INDUCTANCE AND THE UNPROTECTED INTERNAL INDUCTANCE (L_i) OF THE INTRINSICALLY SAFE APPARATUS.

NOTE: ENTITY PARAMETERS LISTED APPLY ONLY TO ASSOCIATED APPARATUS WITH LINEAR OUTPUT.

CLASS I, DIV. 1, GROUPS A AND B

V_{MAX} = 40V	V_T OR V_{OC} IS LESS THAN OR EQUAL TO 40V
I_{MAX} = 165mA	I_T OR I_{SC} IS LESS THAN OR EQUAL TO 165mA
P_{MAX} = 1 WATT	$(\frac{V_T \times I_T}{4})$ OR $(\frac{Voc \times Isc}{4})$ IS LESS THAN OR EQUAL TO 1 WATT
C_I = .01μf	C_A IS GREATER THAN .01μf
L_I =10μH	L_A IS GREATER THAN 10μH

✳ FOR T1 OPTION:

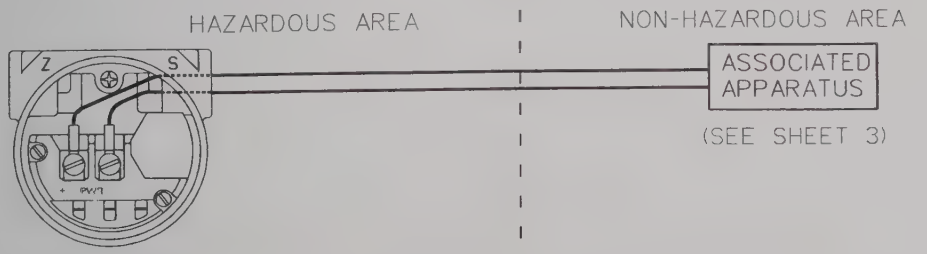
Imax = 160mA	I_T OR I_{SC} IS LESS THAN OR EQUAL TO 160mA
L_I =1.05mH	L_A IS GREATER THAN 1.05mH

CLASS I, DIV. 1, GROUPS C AND D

V_{MAX} = 40V	V_T OR V_{OC} IS LESS THAN OR EQUAL TO 40V
I_{MAX} = 225mA	I_T OR I_{SC} IS LESS THAN OR EQUAL TO 225mA
P_{MAX} = 1 WATT	$(\frac{V_T \times I_T}{4})$ OR $(\frac{Voc \times Isc}{4})$ IS LESS THAN OR EQUAL TO 1 WATT
C_I = .01μf	C_A IS GREATER THAN .01μf
L_I =10μH	L_A IS GREATER THAN 10μH

✳ FOR T1 OPTION:

L_I =1.05mH	L_A IS GREATER THAN 1.05mH



MODELS INCLUDED

3051C	3001C
3051L	3001CL
3051P	3001CH
3051H	3001S
3051CA	3001SL
3051T	3001SH

Rosemount Inc.
12001 Technology Drive
Eden Prairie, MN 55344 USA

DR. MIKE DOBE

ISSUED

THIS DRAWING WAS CREATED ON CAD. DRAWING IS ARCHIVED ON MAGNETIC TAPE FOR ECO CHANGES.

SIZE	FSCM NO	DWG NO.	
A		03031-1019	
SCALE N/A	WT.	SHEET 4 OF 6	

FORM NO. 60b51A REV. C

REVISION			
DESCRIPTION	CHG. NO.	APP'D	DATE
			06-18-98

CLASS I, DIV. 1, GROUPS A AND

V_{MAX} 30V	V_t OR V_{oc} IS LESS THAN OR EQUAL TO 30V
I_{MAX} 165mA	I_t OR I_{sc} IS LESS THAN OR EQUAL TO 165mA
	LESS THAN OR EQUAL TO 1 WATT
	THAN .042μf
	THAN 10μH

	GREATER THAN 0.75mH

	IS
	$(\frac{V_{oc}}{4} \times \frac{I_{sc}}{4})$ IS LESS THAN OR EQUAL TO 1 WATT
	IS GREATER THAN .042μf
	GREATER THAN 10μH

	IS GREATER TH

LOW POWER CONFIGURA
AVAILABLE FOR THE MODELS

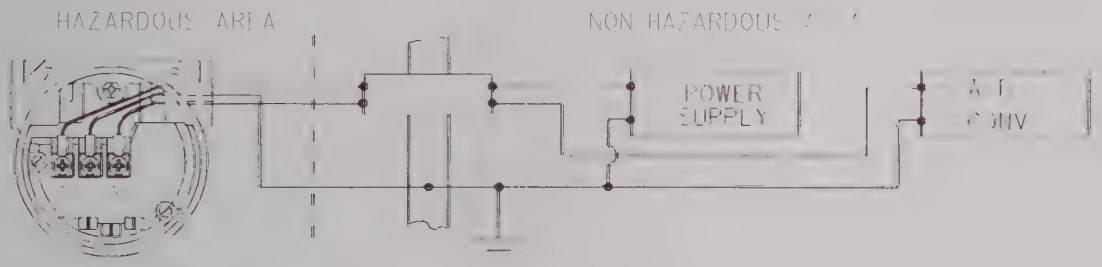
3051C	3051H
3051L	3051CA
3051P	3051T

	THIS DRAWING WAS CREATED ON CAD. DRAWING IS ARCHIVED ON MAGNETIC TAPE FOR ECO CHANGES.			
DR. MIKE DOBE		SIZE A	ESCM NO	DWG NO. 03031-1019
ISSUED		SCALE N/A	WT.	SHEET 5 OF 6

REVISIONS			
	CHG. NO.	APP'D	DATE

66482

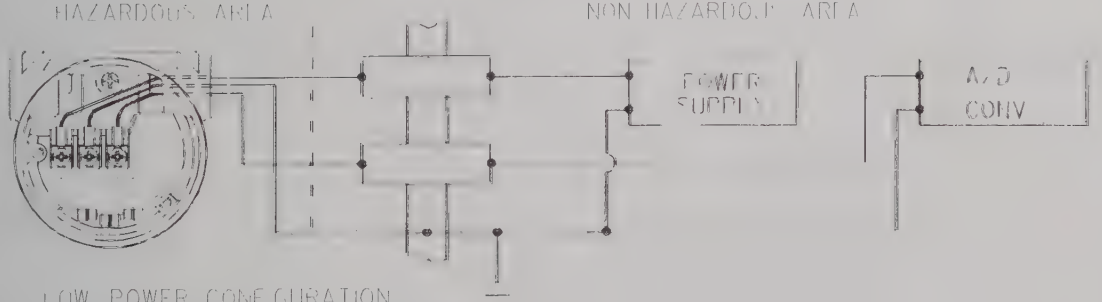
CIRCUIT DIAGRAM 3
ONE DUAL CHANNEL BARRIER



LOW POWER CONFIGURATION
AVAILABLE FOR THE MODELS LISTED

3051C	3051H
3051L	3051CA
3051P	3051T

CIRCUIT DIAGRAM 4
TWO SINGLE CHANNEL BARRIERS
(ONLY FOR USE WITH BARRIERS APPROVED
IN THIS CONFIGURATION)



LOW POWER CONFIGURATION
AVAILABLE FOR THE MODELS LISTED

3051C	3051H
3051L	3051CA
3051P	3051T

THIS DRAWING WAS CREATED ON CAD. DRAWING
ARCHIVED ON MAGNETIC

DR.	SIZE	FSCM NO.	DWG NO.
SANDI MANSON	A		03031-1019
ISSUED	SCALE N/A	WT.	SHEET 6 OF 6

PROPRIETARY INFORMATION IS CONTAINED HEREIN AND MUST BE HANDLED ACCORDINGLY
BY _____ DATE _____

REVISIONS

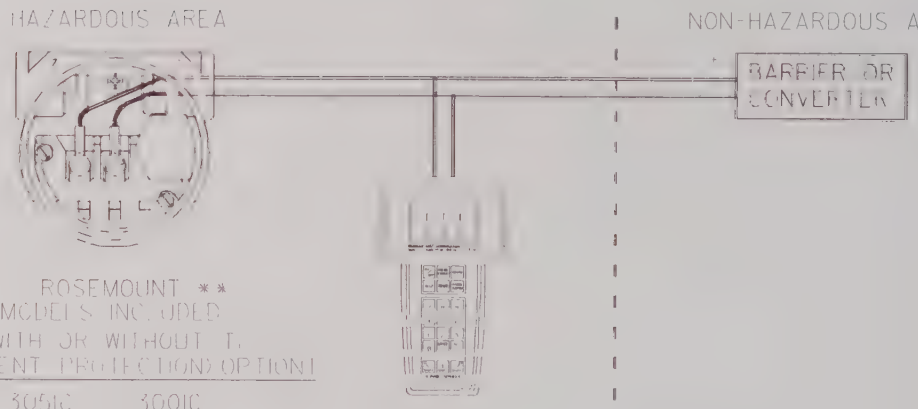
REV	DESCRIPTION	CHG. NO.	APP'D	DATE
E	CLARIFY LOW POWER CONNECTION INFO	646898	G.E.M.	4/94
F	MAKE PARAMETERS ON PG. 3 CLEARER	64/331	G.E.M.	6/95
G	ADD 3044 and 275	664828	G.E.M.	1/96

CSA INTRINSIC SAFETY APPROVALS

CIRCUIT CONNECTION WITH BARRIER OR CONVERTER

Ex ic

INTRINSICALLY SAFE/SECURITE INTRINSEQUE



ROSEMOUNT **
MODELS INCLUDED
EWITH OR WITHOUT T1
(TRANSIENT PROTECTION) OPTION!

3051C	3001C
3051L	3001CL
3051P	3001CH
3051H	3001S
3051CA	3001CL
3051T	3001SH

ROSEMOUNT
MODEL 268 or 275 SMART
FAMILY INTERFACE

WARNING - EXPLOSION HAZARD - SUBSTITUTION OF COMPONENTS MAY IMPAIR SUITABILITY FOR CLASS I, DIVISION 2.

AVERTISSEMENT - RISQUE D'EXPLOSION - LA SUBSTITUTION DE COMPOSANTS PEUT RENDRE CE MATERIEL INACCEPTABLE POUR LES EMPLACEMENTS DE CLASSE I, DIVISION 2.

** FOR THE LOW POWER OPTION, SEE PAGE 3 FOR THE CIRCUIT CONNECTION WITH BARRIER OR CONVERTER.

THIS DRAWING WAS CREATED ON CAD. DRAWING IS ARCHIVED ON MAGNETIC TAPE FOR ECO CHANGES.

UNLESS OTHERWISE SPECIFIED DIMENSIONS IN INCHES. REMOVE ALL BURRS AND SHARP EDGES. MACHINE SURFACE FINISH 125

MATERIAL

DECIMALS	FRACTIONS
.X±.1	±1/32
.XX±.02	ANGLES
.XXX±.010	±2°

DO NOT SCALE PRINT

CONTRACT NO.

DR. Mike Dobe 08/27/90

APP'D. GLEN MONZO 8/31/90

APP'D. GOVT.

Measurement
Control
Analytical
Valves

Rosemount Inc.
12001 Technology Drive
Eden Prairie, MN 55344 USA

TITLE "INDEX OF U.S. CSA I.S. 3051C/L/P/H/T & 3001C/S

SIZE	FSCM NO	DWG NO.
A		03031-1024

SCALE N/A WT. SHEET 1 OF 3

REVISIONS				
REV	DESCRIPTION	CHG. NO.	APP'D	DATE
G		664823		

4-20 mA, ("A" OUTPUT CODE)

DEVICE	PARAMETERS	APPROVED FOR CLASS I, DIV.1
CSA APPROVED SAFETY BARRIER	30 V OR LESS * 330 OHMS OR MORE * 28 V OR LESS 300 OHMS OR MORE 25 V OR LESS 200 OHMS OR MORE * 22 V OR LESS 180 OHMS OR MORE	GROUPS A, B, C, D
FOXBORO CONVERTER 2AI-12V-CGB, 2AI-13V-CGB, 2AS-131-CGB, 3A2-12D-CGB, 3A2-13D-CGB, 3AD-131-CGB, 3A4-12D-CGB, 2AS-12[illegible]-CGB, 3F4-12DA		GROUPS B, C, D
CSA APPROVED SAFETY BARRIER	30 V OR LESS 150 OHMS OR MORE	GROUPS C, D

LOW POWER, ("M" OUTPUT CODE)

DEVICE	PARAMETERS	APPROVED FOR CLASS I, DIV.1
	Supply ≤ 28V, ≥ 300 Ω Return ≤ 10V, ≥ 47 Ω	GROUPS A, B, C, D
CSA APPROVED SAFETY BARRIER	Supply ≤ 30V, ≥ 150 Ω Return ≤ 10V, ≥ 47 Ω	GROUPS C, D

* MAY BE USED WITH ROSEMOUNT MODEL 268 or 275 SMART FAMILY INTERFACE.

Rosemount Inc. 12001 Technology Drive Eden Prairie, MN 55344 USA	THIS DRAWING WAS CREATED ON CAD. DRAWING IS ARCHIVED ON MAGNETIC TAPE FOR ECO CHANGES		
DR. Mike Dobe	SIZE A	FSCM NO	DWG NO. 03031-1024
ISSUED	SCALE N/A	WT.	SHEET 2 OF 3

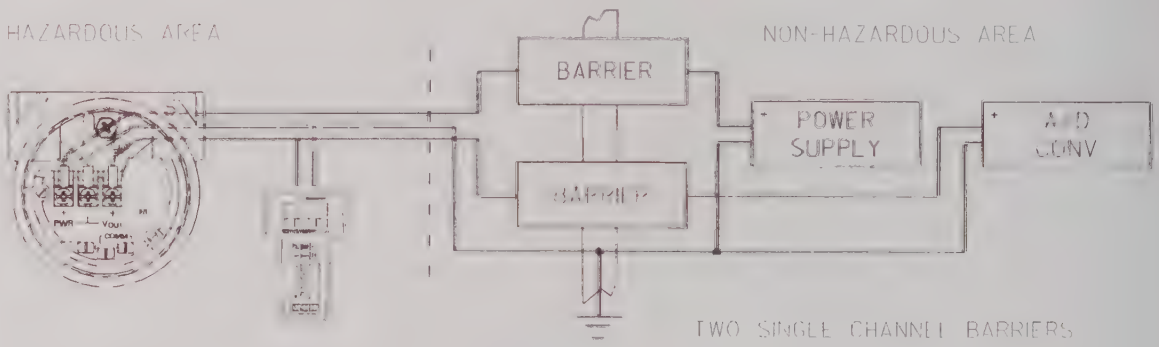
REVISIONS				
REV	DESCRIPTION	CHG. NO.	APP'D	DATE
		1664828		

INTRINSIC SAFETY APPROVALS

OSIF LOW POWER CIRCUIT CONNECTION WITH INTRINSIC SAFETY BARRIER

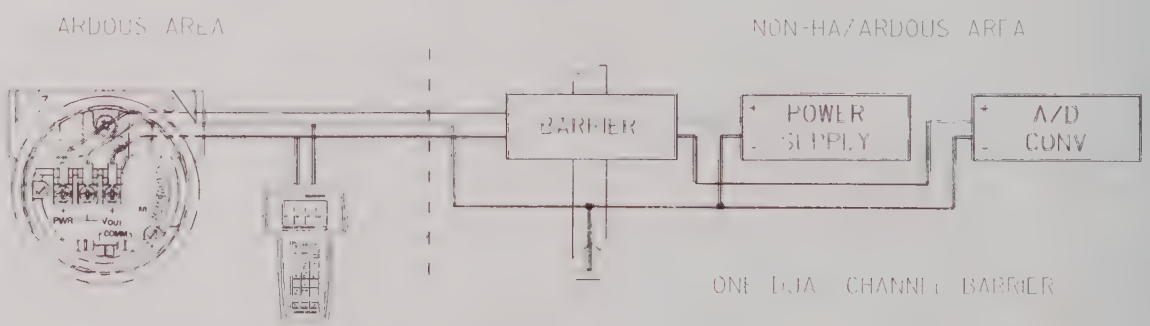
Ex ia

INTRINSICALLY SAFE/SECURITE INTRINSEQUE



OSEMOUNT MODEL 268 or 27

TWO SINGLE CHANNEL BARRIERS



ROSEMOUNT MODEL 268 or 27

ONE DUAL CHANNEL BARRIER

APPROVED FOR CLASS , DIVISION 1, GROUPS A,B,C,D WHEN USED IN CIRCUIT WITH TWO CSA APPROVED SINGLE CHANNEL SAFETY BARRIERS, ONE WITH APPROVED SAFETY PARAMETERS OF 28 VOLTS OR LESS AND 300 OHMS OR MORE IN +PWR LINE, AND ONE WITH APPROVED SAFETY PARAMETERS OF 10 VOLTS OR LESS AND 47 OHMS OR MORE IN Vout LINE, OR ONE CSA APPROVED DUAL CHANNEL SAFETY BARRIER WITH IDENTICAL APPROVED SAFETY PARAMETERS CONNECTED IN LIKE MANNER, AS ABOVE.

APPROVED FOR CLASS I, DIVISION 1, GROUPS C,D WHEN USED IN CIRCUIT WITH TWO CSA APPROVED SINGLE CHANNEL SAFETY BARRIERS, ONE WITH APPROVED SAFETY PARAMETERS OF 30 VOLTS OR LESS AND 50 OHMS OR MORE IN +PWR LINE AND ONE WITH APPROVED SAFETY PARAMETERS OF 10 VOLTS OR LESS AND 47 OHMS OR MORE IN Vout LINE.

Rosemount Inc. 12001 Technology Drive Eden Prairie, MN 55344 USA	THIS DRAWING WAS CREATED ON CAD. DRAWING IS [illegible]		
DR. SANDI MANSON	SIZE A	FSCM NO	DWG NO. 03031-1024
ISSUED	SCALE N/A	WT.	SHEET 3 OF 3

PROPRIETARY INFORMATION IS CONTAINED HEREIN AND MUST BE HANDLED ACCORDINGLY
BY _____ DATE _____

REVISIONS

REV	DESCRIPTION	CHG. NO.	APP'D	DATE
G	ADD SHT 4&5, DELETE CLASS II &III.	636328	B.S.J.	08/01/90
H	ADD 3051 P/L/H, 3001C CL /CH	636904	K.D.V.	09/06/90
J	ADD SHT. 6, FIX TBL. 1.	638723	B.S.J.	01/02/91
K	ADD 3044C	641710	W.R.K.	06/13/91
L	ADD 3001S & SHT 7 FOR 3051C-LP	642380	G.E.M.	8/13/91
M	ADD 3095	653145	K.D.V.	4/8/93

THE ROSEMOUNT MODEL 268 SMART FAMILY INTERFACE IS APPROVED BY FACTORY MUTUAL AS INTRINSICALLY SAFE FOR THE CLASS I, DIVISION 1 GROUPS INDICATED WHEN USED IN CIRCUIT WITH THE BARRIERS AND CONVERTERS LISTED BELOW AND THE ROSEMOUNT SMART FAMILY TRANSMITTERS DEPICTED IN THE ACCOMPANYING CIRCUIT DIAGRAMS.

BARRIER MANUFACTURER	MODEL	APPROVED FOR CLASS I DIVISION 1, GROUPS
FOXBORO	2AI-I2V-FGB	A,B,C,D
	2AI-I3V-FGB	
	2AS-I3I-FGB	
	3A2-I2D-CS-E/FGB-A	
	3A2-I3D-CS-E/FGB-A	
HONEYWELL	38545-000-0110-113-F5B5	C,D
	38545-000-0110-111/112-F5B5	
MTL	115	A,B,C,D
	122	
	322	
	715	
	722	
R. STAHL	8901/31-199/100/7	C,D
	8901/30-199/100/7	
	8901/31-280/165/7	C,D
	8901/30-280/165/7	
	8903/51-200/050/7	A,B,C,D
	8901/31-086/150/7	A,B,C,D
	8901/31-280/165/7	C,D
	8901/31-086/150/7	C,D
	9005/01-245/060	A,B,C,D
	9005/01-252/100	A,B,C,D
TAYLOR	5850FL81200	C,D
	5851FL81200	
	1130FF21000	
	1130FF22000	
	1135FF21000	
	1135FF22000	

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UNLESS OTHERWISE SPECIFIED DIMENSIONS IN INCHES. REMOVE ALL BURRS AND SHARP EDGES. MACHINE SURFACE FINISH 125

- TOLERANCES -

DECIMALS .X±.1 .XX±.02 .XXX±.010 FRACTIONS ±1/32 ANGLES ±2°

DO NOT SCALE PRINT

CONTRACT NO.

DR. MIKE DOBE 2/7/90

CHK'D

APP'D K.CARLSON 03/13/90

APP'D. GOVT.

ROSEMOUNT® Measurement Control Analytical Valves

Rosemount Inc.
12001 Technology Drive
Eden Prairie, MN 55344 USA

TITLE INDEX OF I.S. BARRIER SYSTEMS FOR MOD. 268 SMART FAMILY INTERFACE

SIZE A | DWG NO. 00268-0031

SCALE | WT. | SHEET 1 OF 7

FORM NO 60651A-1 REV C

REVISIONS				
REV	DESCRIPTION	CHG. NO.	APP'D	DATE
M		653145		

ENTITY CONCEPT APPROVALS

THE ENTITY CONCEPT ALLOWS INTERCONNECTION OF INTRINSICALLY SAFE APPARATUS TO ASSOCIATED APPARATUS NOT SPECIFICALLY EXAMINED IN COMBINATION AS A SYSTEM. THE APPROVED [illegible] MAXIMUM SAFE INPUT VOLTAGE (V_{MAX}), MAXIMUM SAFE INPUT CURRENT (I_{MAX}) AND MAXIMUM SAFE INPUT POWER (P_{MAX}) OF THE INTRINSICALLY SAFE APPARATUS, IN ADDITION, THE APPROVED MAXIMUM ALLOWABLE CONNECTED CAPACITANCE (C_A) AND INDUCTANCE (L_A) OF THE ASSOCIATED APPARATUS MUST BE GREATER THAN THE MAXIMUM UNPROTECTED INTERNAL CAPACITANCE (C_I) AND INDUCTANCE (L_I) OF THE INTRINSICALLY SAFE APPARATUS. THE APPROVED ENTITY CONCEPT PARAMETERS ARE AS FOLLOWS: ARE AS FOLLOWS:

NOTE: ENTITY PARAMETERS LISTED APPLY ONLY TO ASSOCIATED APPARATUS WITH LINEAR OUTPUT.

INPUT PARAMETERS (CLASS I, DIV. 1, GROUPS A, B, C, D)				
Vmax = 32 Vdc				V_T or Voc of barrier must be ≤ 32 Vdc
Imax = 186 mA				I_T or Isc of barrier must be ≤ 186 mA
C_i = 0.01 µF				C_A of barrier must be ≥ 0.01 µF
L_i = 1.1 mH				L_A of barrier must be ≥ 1.1 mH
Pmax:	1.1W	0.8W	0.6W	$\frac{Voc \times Isc}{4}$ of barrier must be ≤ specified value.
Temp code	T4A	T5	T6	

OUTPUT PARAMETERS
Voc = 1.5 Vd.c.
Isc = 27 mA
C_A = 10,000 µF
L_A = 46 mH

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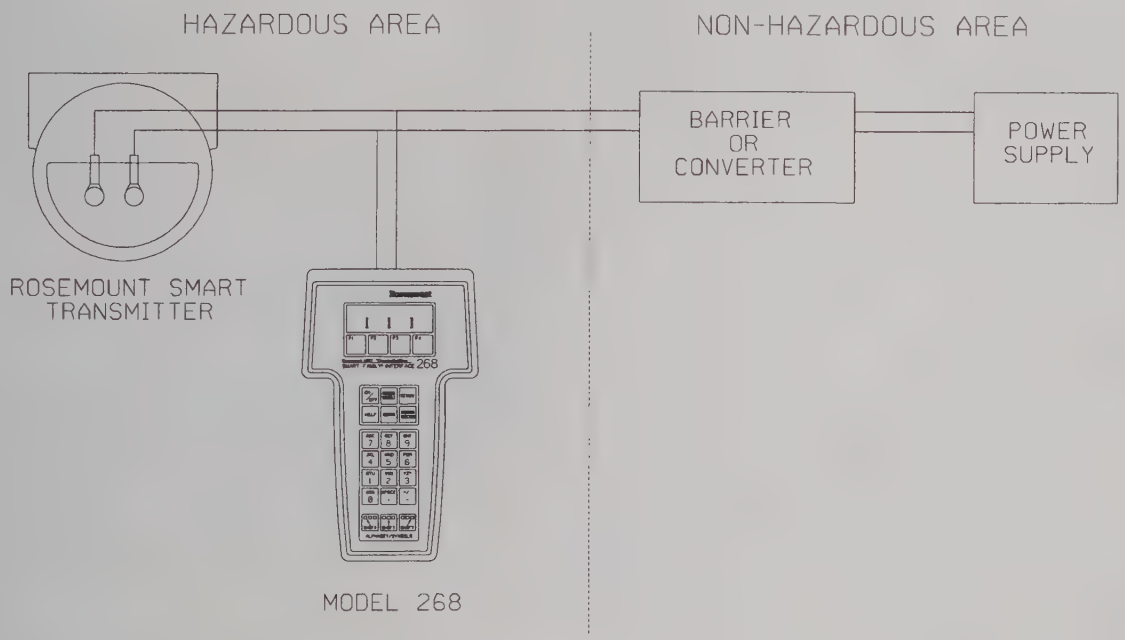
DR. D.PEARSON	SIZE A	SCM NO	DWG NO. 00268-0031
ISSUED	SCALE N/A	WT.	SHEET 2 OF 7

FORM NO. 60651A REV 1

REVISIONS				
REV	DESCRIPTION	CHG. NO.	APP'D	DATE
M		653145		



ROSEMOUNT SMART TRANSMITTERS

MODEL	1151 SMART
MODEL	3051
MODEL	3051C, 3051P, 3051L, 3051H, 3051CA
MODEL	3044
MODEL	3044C
MODEL	3001C, 3001CL, 3001CH
MODEL	3311
MODEL	3001S, 3001SL, 3001SH
MODEL	3095

UP TO FOUR MODEL 751 INDICATORS MAY BE WIRED IN SERIES WITH THE TRANSMITTERS SHOWN ABOVE AND MAY BE LOCATED IN EITHER THE HAZARDOUS OR NON-HAZARDOUS AREA

Rosemount Inc.
12001 Technology Drive
Eden Prairie, MN 55344 USA

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DR.	SIZE	FSCM NO	DWG NO.
D.PEARSON	A		00268-0031
ISSUED	SCALE N/A	WT.	SHEET 3 OF 7

FORM NO 60651A-1 REV. C

REVISION				
REV	DESCRIPTION	CHG. NO.	APP'D	DATE
M		653145		

THE MAXIUM ALLOWABLE CONNECTED INDUCTANCE (La) OF THE ASSOCIATED APPARATUS IS DETERMINED BY ADDING 27 mA TO THE Isc OF THE BARRIER (Im=Isc + 27mA AND ENTERING TABLE 1 (SHT 5) AT THE RESULTING VALUE, Im, OR THE NEXT HIGHER VALUE OF Im, TO DETERMINE THE La, (THE La MUST INCLUDE THE L_i OF THE MODEL 268, WHICH IS 1.1mH).

EXAMPLE #1: Isc OF BARRIER = 100mA.

Im = 100mA + 27mA = 127mA

ENTER TABLE AT Im = 130mA; La = 2.0mH

--WARNING-- BEFORE CONNECTING THE MODEL 268 INTO THE LOOP, DETERMINE THE CONNECTED INDUCTANCE OF THE SYSTEM BY ADDING THE L_i OF THE TRANSMITTER, CABLE, AND MODEL 268. THE SUM MUST BE LESS THAN THE La DETERMINED FROM THE TABLE IN ORDER FOR THE MODEL 268 TO BE CONNECTED INTO THE LOOP. IF THE CONNECTED INDUCTANCE IS GREATER THAN THE VALUE DETERMINED FROM THE TABLE, A BARRIER WITH A LOWER Isc MUST BE CHOSEN.

EXAMPLE #2: BARRIER ISC = 41.8mA; BARRIER LA = 20.0mH

IM = 41.8mA + 27mA = 68.8mA;

ENTER TABLE AT 70mA AND READ La = 7.5mH

ADD CONNECTED INDUCTANCE OF SYSTEM:

MODEL 268	L_i = 1.1mH
MODEL 3051 TRANSMITTER	L_i = 0.48mH
INDUCTANCE OF LOOP WIRING	1.0mH
TOTAL CONNECTED INDUCTANCE	= 2.58mH

TOTAL CONNECTED INDUCTANCE IS LESS THAN La = 7.5 mH AS DETERMINED ABOVE AND IS ALSO LESS THAN THE BARRIER La. THE MODEL 268 MAY SAFELY BE CONNECTED INTO THE LOOP. IF THE MODEL 751 INDICATORS ARE USED, THEIR TOTAL INDUCTANCE (LABEL VALUE * NUMBER OF INDICATORS) MUST ALSO BE INCLUDED.

S.BARDUSON 30JUL90	SIZE A	FSCM NO	DWG NO. 00268-0031	
	SCALE N/A	WT.	SHEET 4 OF 7	

FORM NO 60651A 1 REV. C

REVISIONS				
REV	DESCRIPTION	CHG. NO.	APP'D	DATE
M		653145		

Im (mA)	La ()mH)
150	1.3
145	1.5
140	1.6
130	2.0
120	2.5
110	3.0
100	4.0
90	5.0
85	5.5
80	6.0
75	6.7
70	7.5
65	8.8
62	9.5
60	10.0
57	11.0
55	12.0
50	15.0
45	19.0
40	23.0
35	31.0

TABLE 1

Rosemount Inc.
12001 Technology Drive
Eden Prairie, MN 55344 USA

DR. S.BARDUSON 30JUL90

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SIZE A | FSCM NO | DWG NO. 00268-0031

CALE N/A | WT. | SHEET 5 OF 7

FORM NO 60651A REV C

Glossary

OVERVIEW

Some of the terms used in this manual relate specifically to the operation of Rosemount transmitters, hand-held communicators, and other Rosemount products. The following list provides brief definitions. See the sections listed for additional information.

Analog Output Trim

Digital Trim operation that allows adjustment of the output electronics to conform to the plant standard of current. Three types of analog output trim are available: 4–20 mA Trim, 4–20 mA Other Scale, and Low Power. See Page 2-20.

Cloning

Off-line operation that uses the Model 268 to copy configuration data from one transmitter to one or more other transmitters that require the same data. See Page 2-23.

Commissioning

Functions performed with the HART-based communicator and the transmitter which test the transmitter, test the loop and verify transmitter configuration data. See Page 2-1.

Configuration

Process of setting parameters that determine how the transmitter operates. Page 2-7.

Damping

Output function that increases the response time of the transmitter to smooth the output when there are rapid input variations. See Page 2-12.

Descriptor

Sixteen-character field for additional identification of the transmitter, its use, or location. The descriptor is stored in the transmitter and can be changed using the HART-based communicator.

Digital Trim

Format function that allows you to adjust the transmitter characterization for purposes of digital calibration to plant standards. Digital Trim includes two separate operations: Sensor Trim and Analog Output Trim. See Page 2-18.

Failure Mode Alarm

Transmitter function that drives the analog output to a jumper-selectable high or low value in the event of an electronics failure. See Page 2-2.

Factory Characterization

Factory process during which each sensor module is subjected to pressures and temperatures covering the full operating range. The sensor module memory stores data generated from this process for use by the microprocessor in correcting the transmitter output during operation.

Full Trim

Sensor Trim function in which two accurate, end-point pressures are applied, and all output is linearized between them. The selected end points should always be equal to or outside the LRV and URV. See Page 2-19.

HART (Highway Addressable Remote Transducer) Protocol

Communications standard that provides simultaneous analog and digital signal transmission between control rooms and field devices such as transmitters. All Rosemount SMART FAMILY products communicate using the HART protocol.

Lower Range Limit (LRL) Lowest value of the measured variable that the transmitter can be configured to measure. See Page 2-8.

Lower Range Value (LRV) Lowest value of the measured variable that the analog output of the transmitter is currently configured to measure. See Page 2-8.

Multidropping The connection of several transmitters to a single communications transmission line. Communication between the host and the transmitters takes place digitally with the analog output of the transmitters deactivated. See Page 2-23.

Reranging Configuration function that changes the transmitter 4 and 20 mA settings. See Page 2-10.

Send Data HART-based communicator command that transfers configuration data from the hand-held communicator's memory to the transmitter memory.

Sensor Trim Digital Trim function that allows you to adjust the digital process variable reading to a precise pressure input. Zero Trim and Full Trim are the two Sensor Trim functions. See Page 2-18.

Smart Term used to describe instruments that are microprocessor-based and feature advanced communications capabilities. See Section 1 Introduction.

SMART FAMILY Rosemount pressure, temperature, level, and flow instruments with microprocessor-based digital electronics.

Span Algebraic difference between the upper and lower range values.

Tag Eight-character field for identifying the transmitter. The tag is stored in the transmitter and can be changed using the Model 268 and the Transmitter Information function.

Transmitter Address Unique number (1-15) used to identify a multidropped transmitter. Transmitters that are not multidropped have 0 as an address. See Page 2-24.

Transmitter Security Jumper-selectable feature that prevents accidental or deliberate changes to configuration data. See Page 2-4.

Upper Range Limit (URL) Highest value of the measured variable that the transmitter can be configured to measure.

Upper Range Value (URV) Highest value of the measured variable that the analog output of the transmitter is currently configured to measure.

Zero Trim A zero-based, one-point adjustment used in differential pressure applications to compensate for mounting position effects or zero shifts caused by static pressure. See Page 2-19.

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